Metals Review
THE NEWS DIGEST MAGAZINE
Published by the American Society for Metals
Volume XXIII - No. 8 August 1950

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* *From Attendance Report No. 4 in a continuing analysis of Metal Show visitors. Write for a copy.*

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OCT. 23-27, 1950

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Metals Review

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THE NEWS DIGEST MAGAZINE

VOLUME XXIII, No. 8 AUGUST, 1950

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• • •

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Arthur E. Focke, President; Walter E. Jominy, Vice-President; William H. Eisenman, Secretary; Ralph L. Wilson, Treasurer; Thomas G. Digges, Elmer Gammeter, Fred J. Robbins, Harry P. Croft, Trustees; Harold K. Work, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers in Central Europe, Asia, or the Pacific islands other than Hawaii, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

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The yearly editions of the A.S.M. Review of Metal Literature are your reference key to all published information on metals and the metal industry. Volume 6 contains a complete survey of all the metallurgical literature published during the period January through December 1949.

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The table of contents lists the 25 subdivisions and classifications of the industry with explanatory notes on each. This classification is arranged primarily by process, and is supplemented by the comprehensive subject index, liberally sprinkled with cross-references, for quickly and easily locating the information you need on any phase of metallurgy and related fields.

The abstracts are better designated as annotations, since they are brief notes indicative of the contents and not a substitute for a reading of the article or book. All of these brief digests were prepared by the expert librarians and abstractors on the staff of Battelle Memorial Institute. The extensive holdings in the Battelle library insure a complete coverage of both domestic and foreign literature.

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Copies of the first five volumes of the A.S.M. Review of Metal Literature (1944 through 1948) are still available at the same price as the present volume ($10 to A.S.M. members; $15 to nonmembers). Make your file complete and order the back issues while they are still in print.

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Getting the Most From The Metal Show

Excerpts From an Article by Guy Hubbard Published in Steel, Oct. 10, 1949, Containing Useful Hints for Those Who Plan to Attend the Coming National Metal Congress and Exposition in Chicago, Oct. 23-27, 1950

THIRTY-ONE years ago a new and little-known society of "steel treaters"—destined to become the American Society for Metals—staged the first of a continuing series of annual metal shows. It would indeed have been a bold prophet who would have predicted that in 1949 the direct descendant of that original show would fill such a huge structure as the Cleveland Public Hall and annex with more than 300 exhibits, which would draw more than 30,000 visitors.

Had it remained strictly a metal show, it probably never would have developed to any such extent. Nor would it be of any such over-all service to industry as is the case of the Exposition and Metal Congress as we know it today. Due to the system under which American production metalworking industries now are set up, selection of metals, design of metal parts, cutting, forming and fabricating of those parts, their metallurgical treatment, their inspection, their finishing and methods of assembly all are intimately related. The manufacturing, inspection and assembling phases in many cases are actually tied together and co-ordinated in conveyorized production and assembly lines.

That is why the latest developments in the broad and related fields of materials, methods and machines will be demonstrated so effectively and explained so completely during the course of the 1949 Metal Congress and Exposition. Obviously all this is of interest and value not alone to metallurgists, but equally so to designers and product engineers, to tool and production engineers, to inspectors, to ambitious shop men, to business executives sincerely concerned over profitable operation of their plants and to sales executives "constructively worried" about competitive standing of their products in terms of design, quality and cost. . . .

Advance Planning Vital

For the person with limited time available, the problem of covering adequately an affair as large in size and in scope as the Metal Show and Congress always is a difficult one. It is one which requires careful advance planning for proper solution. An affair of this kind can be all things to all people depending, in the case of each individual, upon what his primary interests, and what his company's primary interests are in sending the individual to Cleveland.

The experience of the writer—on the basis of 35 years of attending industrial conventions and exhibitions—is that preliminary study of the program and the list of exhibits [to be published in the September issue of *Metals Review*] will help tremendously in laying out a workable and profitable individual itinerary. . . .

Interests Really Broad

An individual seldom realizes how broad his interests actually are until study of the interlocking character of modern specialized subjects in industry is made. As a help to self-analysis along this line, let us take a look at some of the major heads under which A.S.M. lists the interests of its membership. No attempt is made here to list these in order of importance for the simple reason that there is no such order. What is important to one may be of little or no interest to another. Hence the list may seem rambling.

Starting with the basic subject of materials, come smelting and refining; properties; and constitution and structure. Moving on into what happens to materials, we run into powder metallurgy; corrosion and its prevention; cleaning and finishing; and electrodeposition and electrofinishing. In the realm of the laboratory and inspection, we encounter physical and mechanical testing; analysis; apparatus and instruments; inspection and standardization; and temperature measurement and control.

Continuing our ramble over the field, we encounter foundry practice (including such refinements as die casting, permanent mold casting and the lost-wax processes); and scrap and by-product utilization. Related to these are furnaces and other heating devices; refractories and furnace materials; and heat treatment.

Along the production lines we run into press working and forging; machining and machinability; and miscellaneous fabrication methods. Then come joining and flame cutting (under which head come welding, brazing, etc.). Then under the general heads of applications and design lie a multitude of possibilities.

Regardless of the limitations on time, and regardless of the care with which the itinerary has been mapped out in advance, the writer has found that it invariably is desirable to make one "whirlwind tour" of an entire exhibit before concentrating on details. Oftentimes one will discover in passing, details which have been overlooked in the "mapping".

These are apt to be new and important things. They can be "spotted" for a return visit. The whirlwind tour should not be interrupted. Its object is to give an over-all perspective of the whole show.

Check Your Coverage

Having made your whirlwind tour you may have noticed certain things which will cause you to want to re-evaluate your coverage of the congress sessions as well as of the show itself. Find a quiet spot and take a little time to re-mark your exhibitors' list, your map and your program. That also will give your tired feet a needed rest. In case you are not trying to cover the show alone, this is a good time to subdivide the task of coverage among the group—whose individual "findings" later can be consolidated into a group report.

These are days of quick technological and industrial upsets due to

Hotel Reservations

Hotel reservation forms for the National Metal Congress and Exposition in Chicago, Oct. 23 through 27, have been mailed out to all members of the American Society for Metals. If any of them have miscarried or been mislaid, duplicates may be secured either from the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, or from the Chicago Convention Bureau, Inc., 33 North LaSalle St., Chicago 2. Reservations should be sent in as promptly as possible.

new materials, methods and machines. You are at the show to detect those possibilities so that you can orient your future design, production and inspection activities accordingly. Don't skimp on time or manpower while the show and congress are in action. An extra day or an extra observer dedicated to some "hot" discovery which you make on your whirlwind tour may mean a full reservoir of new knowledge which will be the salvation of some important phase of your business. . . .

Like the person who couldn't see the forest because of the trees, there is danger that an observer at a huge show such as that of ASM will lose sight of main objectives in the tremendous multiplicity of exhibits. To help in keeping the main objectives in view it will be well to remember a few basic things. First and foremost, remember that your primary reason for being at the show is to discover ways and means to make better things cheaper.

From the standpoint of materials, that means among other things that you must look for something which is equal to what you are using but less expensive, which is stronger than what you are using and of which you will need to use less quantity, that can be processed with less scrap loss, that can be processed cheaper, that will require little or no finishing, that will have increased sales appeal.

Conservation Important

In the realm of methods and machines, some of the goals you should aim at are materials conservation—as, for example, getting more metal into parts and less into chips or other scrap; power conservation through elimination of machining; freer cutting and reduction of the number of operations required; conservation of heat through elimination or localization of heating operations, through insulation and fuel efficiency; elimination of spoiled work through testing of raw materials, nondestructive testing of parts in process, and mechanized inspection and gaging between operations; conservation of manpower through mechanization of transferring, processing, inspection and assembly.

In following through on manpower conservation, keep safety constantly in mind. Accidents represent the most inexcusable loss of manpower. No process deserves consideration unless every possible hazard has been designed out.

When Charles Dawes took up his duties as ambassador to the Court of St. James, he found the job to be "easy on the head but tough on the feet". Your job as ambassador to the Metal Show and Congress, however, calls for efficient use of brains and feet.

GUY HUBBARD

A. S. M. Annual Meeting

To the Members of the A.S.M.:

This is your official notice that the annual meeting of the American Society for Metals will be held in the ballroom of the Palmer House, Chicago, on Wednesday morning, 9:30 a.m., Oct. 25, 1950. All members of the Society in good standing are privileged to attend and vote.

W. H. Eisenman, Secretary
Cleveland, Ohio, Aug. 1, 1950.

The Reviewing Stand

THE ARTICLE above, which starts on the preceding page, should be read by everyone who plans to attend the National Metal Congress and Exposition in Chicago Oct. 23 through 27. Written by Guy Hubbard and originally published in *Steel* last fall, it contains so many useful suggestions for getting the most out of the Congress and Exposition that it well warrants reprinting.

More than ever before it is imperative that those attending the Metal Show make most efficient use of their time. With the dark clouds gathering on the world's horizons, high production in all of industry is vitally essential. Particularly is this true in the strategic metalworking industry.

All of the events of the Congress will be planned to demonstrate ways and means of attaining this high production. At the same time, economy in production —the theme of last year's Metal Show—will continue to be stressed, and methods of saving in costs, labor, materials and particularly *time* will not be overlooked. Thus, the Metal Congress will give the metal industry a tremendous boost in gearing itself to the greatest production effort of all time.

In addition to the points brought out in Mr. Hubbard's article, the value of preparing written reports of the Congress should not be overlooked. No matter how good the individual's memory, there is too much to be seen and heard to rely upon recollection alone. Notes are essential. The man who is there on his own may find the notes sufficient and never need to expand them; the man who is sent to the Congress by his company, however, owes it to his superiors, to his job and to himself to take careful notes and expand them into a written report. These notes should cover what he hears at the technical sessions, what he sees at the exhibits, and what he learns by talking with men in his own and related lines of activity.

The value of a written report applies to the production metallurgist, the scientist and researcher, the plant executive, the engineer, and the foreman alike. The production metallurgist, the executive and the engineer may pick up some ideas that are not immediately applicable to his present operations but that, placed on the record and filed away, might prove highly useful in the near future. The research engineer and the scientist not only learns what is being done by others so that he does not needlessly repeat experiments already performed, but he likewise has the opportunity of accumulating a notebook full of ideas for possible future application.

In other words, a concrete, factual, written report of what you saw and heard at the Metal Congress will more than justify the expense advanced by your company for your trip; it will help you to progress in your job and in your own work; and finally, the foreknowledge that you will prepare such an organized report will help you to plan your time and activities to greatest advantage.

Questions We Can't Answer Department

The following query has us stumped:

"As a constant reader of your publication, I feel sure that with all the wealth of material at your disposal, you may possibly have come across a publication that may help me out of my present difficulty.

"I am searching for a 'laying-on' mixture, which when pasted on toolsteel will protect it, when hardened in lead, from (*a*) decarburization, and (*b*) from lead adhering to it. At the same time it should prevent so deep a discoloration that it can only be removed by very strong acid.

"I would be ever so grateful if you could put me onto some information leading to a solution."

Any suggestions will be gladly transmitted to this reader.

M.R.H.

Technical Program

Chicago, Oct. 23-27, 1950

Tentative Program of Technical Papers for National Metal Congress, Numbered for Ordering of Preprints

Monday, Oct. 23—9:30 A.M.

Surface Phenomena Session

1. **The Carbonitriding Process of Case Hardening Steel,** by G. W. P. Rengstorff, M. B. Bever and C. F. Floe, Massachusetts Institute of Technology.
2. **Constitution of Carbonitrided Cases,** by G. W. P. Rengstorff, M. B. Bever and C. F Floe, Massachusetts Institute of Technology.
3. **Effect of Bath Composition on Aluminum Coatings on Steel,** by D. O. Gittings, D. H. Rowland and J. O. Mack, Carnegie-Illinois Steel Corp.
4. **Formation of Oxides on Some Stainless Steels at High Temperatures,** by H. M. McCullough, Sylvania Electric Products Inc., and M. G. Fontana and F. H. Beck, Ohio State University.
5. **The Oxidation of Pure Iron,** by J. K. Stanley and Miss J. vonHoene, Westinghouse Research Laboratories, and R. T. Huntoon, Carnegie Institute of Technology.

Monday, Oct. 23—2:00 P.M.

Physical Metallurgy Session

6. **Recovery and Cold Working of 52S Commercial Aluminum Alloy,** by Gerard H. Boss, Metallurgy Division, Oak Ridge National Laboratory.
7. **A Metallurgical Investigation of Silver Chloride,** by R. D. Moeller, F. W. Schonfeld, C. R. Tipton, Jr., and J. T. Waber, Los Alamos Scientific Laboratory.
8. **Molybdenum Plating by Reduction of the Pentachloride Vapor,** by W. J. Childs, J. E. Cline, W. M. Kisner and John Wulff, Massachusetts Institute of Technology.
9. **Structure of Permanent Magnet Alloys,** by A. H. Geisler, General Electric Co.

Tuesday, Oct. 24—9:30 A.M.

High-Temperature Metallurgy Session

10. **Transformations in Ferritic Chromium Steels Between 1100 and 1500° F. (595 and 815° C),** by F. J. Shortsleeve and M. E. Nicholson, Standard Oil Co.
11. **Hardening of High-Chromium Steels by Sigma Phase Formation,** by John J. Gilman, Crucible Steel Co. of America.
12. **Nickel - Aluminum - Molybdenum Alloys for Service at Elevated Temperatures,** by H. V. Kinsey, Department of Mines and Technical Surveys, Ottawa, and M. T. Stewart, National Research Council of Canada.
13. **Sigma Phase Formation in a Wrought Heat Resisting Steel,** by A. E. Bindari, Illinois Institute of Technology; P. K. Koh, Allegheny Ludlum Steel Corp., and Otto Zmeskal, Ill. Inst. of Technology.

* **Long-Time Elevated-Temperature Test of Chromium-Molybdenum Steels,** by A. B. Wilder and J. O. Light, National Tube Co.

Tuesday, Oct. 24—2:00 P.M.

High-Temperature Metallurgy

14. **Formation of Austenite in High-Chromium Stainless Steels,** by C. B. Post and W. S. Eberly, Carpenter Steel Co.
15. **Influence of Austenitizing Time and Temperature on Austenite Grain Size of Steel,** by O. O. Miller, Research Laboratory, U. S. Steel Corp.
16. **Carbide Precipitation in AISI Type 304 Stainless Steel—an Electron Microscope Study,** by E. M. Mahla and N. A. Nielsen, E. I. du Pont de Nemours & Co.
17. **Some Aspects of Graphitization in Steel,** by G. V. Smith, J. A. MacMillan and E. J. Dulis, Research Laboratory, U. S. Steel Corp.

Wednesday, Oct. 25—9:30 A.M.

ASM Annual Meeting

**Campbell Memorial Lecture*

All of the numbered papers herewith will be preprinted for distribution to members of the American Society for Metals. (Those papers marked by an asterisk will not be preprinted.) The society will print only 10% in excess of the number of orders for preprints in the office on press date, and this excess 10% will be sent out as long as it lasts. Order by number from this list before Sept. 1, 1950.

Wednesday, Oct. 25—2:00 P.M.

Heat Treatment Session

18. **A Hardenability Test for Deep Hardening Steels,** by William Wilson, Jr., Armour Research Foundation.
19. **An Examination of the Quenching Constant, H,** by D. J. Carney and A. J. Janulionis, Carnegie-Illinois Steel Corp.
20. **The Tempering of Chromium Steels,** by R. W. Balluffi, Sylvania Electric Products, Inc.; Morris Cohen and B. L. Averbach, Massachusetts Institute of Technology.

* **Austenite Transformation,** by Axel Hultgren, Professor of Metallography, K. Tekniska Hogskolan, Stockholm, Sweden.

Thursday, Oct. 26—9:30 A.M.

Fracture Session

21. **Grain and Grain Boundary Compositions: Mechanism of Temper Brittleness,** by J. W. Spretnak and Rudolph Speiser, Ohio State University.
22. **Effect of Strain Rate on Toughness of Temper Brittle Steel,** by D. C. Buffum and L. D. Jaffe, Watertown Arsenal.
23. **The Influence of Chromium on the Mechanical Properties of Plain Chromium Steels,** by W. O. Binder and Howard R. Spendelow, Jr., Union Carbide and Carbon Research Laboratories, Inc.
24. **Rheotropic Embrittlement of Steel,** by E. J. Ripling and W. M. Baldwin, Jr., Case Institute of Technology.
25. **Embrittlement of Stainless Steel by Steam in Heat Treating Atmospheres,** by C. A. Zapffe and R. L. Phebus, Research Metallurgists.

Thursday, Oct. 26—9:30 A.M.

Constitution of Alloys Session

26. **The Ternary System Chromium-Molybdenum-Iron,** by J. W. Putman, Massachusetts Institute of Technology; R. D. Potter, University of California; and N. J. Grant, Massachusetts Institute of Technology.

Continued on Next Page

* Not preprinted

27. **The Ternary System Indium-Cadmium-Zinc,** by S. C. Carapella, Jr., and E. A. Peretti, University of Notre Dame.
28. **The Determination of Solidus Temperatures in Magnesium Alloys by Dilatometric Measurements,** by Heinrich Adenstedt, Wright-Patterson Air Force Base, and Jay R. Burns, Dow Chemical Co.
29. **Constitution and Mechanical Properties of Zirconium-Iron Alloys,** by E. T. Hayes, A. H. Roberson and W. L. O'Brien, Bureau of Mines, Albany, Ore.

Thursday, Oct. 26—2:00 P.M.

Fracture Session

30. **Fracturing of Silicon Ferrite Crystals,** by C. F. Tipper, Cambridge University, England, and M. Sullivan, Naval Research Laboratory, Washington, D. C.
31. **A Study of Cleavage Surfaces in Ferrite,** by E. P. Klier, University of Maryland.
32. **Fractographic Registrations of Fatigue,** by C. A. Zapffe and C. O. Worden, Research Metallurgists.
33. **Effect of Alloying Elements on Notch Toughness of Pearlitic Steels,** by J. A. Rinebolt and W. J. Harris, Jr., Naval Research Laboratory.

Friday, Oct. 27—9:30 A.M.

Plasticity Session

34. **The Stress-Strain Energy Relationship for Metals,** by D. J. McAdam Jr., Consulting Metallurgist.
35. **Tension - Compression Biaxial Plastic Stress-Strain Relations for Aluminum Alloys 24S-T and 2S-O,** by J. H. Faupel, E. I. du Pont de Nemours & Co., and Joseph Marin, Pennsylvania State College.
36. **Hot Forming of Aluminum and Magnesium Alloys,** by T. E. Piper, Northrop Aircraft, Inc.
37. **Strain Hardening of Mild Steel in the Torsion Test as a Function of Temperature,** by Hugh Larson, Massachusetts Institute of Technology, and E. P. Klier, University of Maryland.

Friday, Oct. 27—9:30 A.M.

Physical Metallurgy Session

38. **The Powder Metallurgy of Beryllium,** by H. H. Hausner and Norman P. Pinto, Sylvania Electric Products, Inc.
39. **The Dimensional Behavior of Invar,** by B. S. Lement, University of Notre Dame; B. L. Averbach and Morris Cohen, Massachusetts Institute of Technology.
40. **Preparation and Properties of Titanium-Chromium Binary Alloys,** by D. J. McPherson, Armour Research Foundation, and M. G. Fontana, Ohio State University.
41. **Statistical Analysis of the Effect of Alloying Elements on Mechanical Properties of Seamless Steel Tubes,** by W. T. Rogers, National Tube Co.
42. **Grindability of Tool Steels,** by L. P. Tarasov, Norton Co.

Trustees Meet in Montreal

In the Center of the Speakers' Table at a Dinner Held for the A. S. M. National Board of Trustees in Montreal Are (From Left): E. M. Seale, Chairman of the Montreal Chapter; National President Arthur E. Focke; Mrs. Seale; and National Vice-President Walter Jominy. The dinner was attended by the chairmen and past chairmen of all of the Canadian chapters. The two-day trustees' meeting was held in Montreal on May 17 and 18 at the invitation of C. M. Carmichael, a national trustee and past chairman of the Montreal Chapter. (Photo by Gordon Sproule)

Casting of Short Ingots Provides Best Structure For Aluminum Extrusions

Reported by Kenneth B. Lloyd
Research Project Engineer
University of California

A former secretary returned to address the Golden Gate Chapter A.S.M. on "Extrusion of Aluminum Alloys" at the May 8th meeting in San Francisco. Roy Paine, Stanford alumnus, now chief metallurgist for Aluminum Co. of America, Vernon Works, discussed the history, development, and current applications of the extrusion process for producing aluminum alloy shapes.

Design of equipment, selection of alloy, and the choice of operating temperatures, speeds, and pressures were pointed out as factors affecting the optimum properties of the extruded sections. The latest development is casting into a short water-cooled mold (6 to 8 in.) to produce an ingot several feet in length for subsequent extrusion. This casting method provides control of the ingot structure, which contributes to the good properties of modern extrusions. Various aluminum alloys have been developed to produce extrusions of desired strength and corrosion resistance with economical heat treatments following extrusion.

Mr. Paine ran off the Alcoa motion picture "The Davenport Story" showing the use of extruded products in the building of this newest aluminum plant. A hitherto unexploited aluminum use seemed suggested in a member's quiet "I wonder what they used in the foundations." A group discussion period followed, with many questions on the extruded samples that Mr. Paine displayed; Alcoa's role as a primary producer rather than a fabricator was pointed up during this interval.

The new Golden Gate Chairman, Harry Lewis, of Dexter Metal Treating Co., presented Irving Leheny of Allegheny Ludlum Steel Co., outgoing chairman, with a wall plaque and a desk fountain pen set as mementos from the chapter for his fine service.

M. I. T. Holds Conference On Fatigue and Fracture

A special summer conference on "Fatigue and Fracture of Metals" was held at Massachusetts Institute of Technology June 19 to 22, with an attendance of about 150. Arthur E. Focke, chief metallurgist, Diamond Chain Co., Inc., and president of the American Society for Metals, was A.S.M. representative at the conference.

The M.I.T. committee that arranged the meetings consisted of J. C. Hunsaker, department of aeronautical engineering; E. L. Cochrane, department of naval architecture and marine engineering; J. T. Norton, department of metallurgy; J. C. Slater, department of physics; C. R. Soderberg and W. M. Murray, department of mechanical engineering.

Twelve formal papers were presented, and supplemented by panel discussions. The complete proceedings of the conference will be published as promptly as possible. Requests for copies should be addressed to Prof. W. M. Murray, Room 3-257, Massachusetts Institute of Technology, Cambridge 39, Mass.

Specific Parts Show Problems Met in Jet Engine Materials

Reported by Knox A. Powell
Research Engineer
Minneapolis-Moline Co.

The importance of design in the selection of materials for high-temperature parts of jet engines and turbo-superchargers was emphasized by Robert B. Johnson of the metallurgical section of the General Electric Thomson Laboratory, addressing the Northwest Chapter A.S.M. on May 18. As in most aircraft applications (particularly for the Military), long life of jet engine parts tends to be sacrificed for performance. This trend is expected to continue even though materials are substantially improved.

High-temperature parts are also subject to high stresses; in rotating parts these high stresses are produced by high speeds, alternating loads, and changing thermal gradients, while in stationary parts the stresses are caused primarily by the latter two factors.

Mr. Johnson showed pictures to illustrate specific parts and explained the typical problems encountered in the development of such apparatus.

The combustion chamber on the jet engine operates up to 1800° F. It is dependent upon high strength at this temperature and must possess oxidation resistance and resistance to thermal shock.

The nozzle diaphragm partitions require resistance to thermal shock and oxidation resistance up to 1650° F.

The turbine wheel must have high creep strength up to 1200° F. and a high room-temperature yield strength as well as good ductility.

The turbine buckets must have good creep, stress-rupture, and fatigue strength. They must also be resistant to thermal shock, oxidation and corrosion in the temperature range of 1200 to 1500° F.

The jet engine tailcone operates between 900 and 1400° F., and is subject to thermal shock and high-temperature fatigue.

The supercharger nozzlebox encounters temperatures of 1200 to 1650° F., and requires a good high-temperature fatigue strength. It must resist the corrosive attack of the products of combustion of leaded aviation gasoline.

Emphasis is currently being placed on the conservation of strategic elements in material selections for high-temperature parts. The alloys used for turbine buckets such as Vitallium and S-816, are the chief offenders in the use of strategic elements. It is possible that, through improvement in design, such as air cooling, less strategic alloys can be used for these parts.

The meeting closed with a lively question-and-answer period which indicated the intense interest in jet engine development for civil as well as military purposes.

"Binary Curriculum" Offered

A new curriculum for combined liberal arts and engineering education has been announced by six middle western colleges. Participating in the new plan are Coe College, Cedar Rapids, Iowa; DePauw University, Greencastle, Ind.; Marietta College, Marietta, Ohio; Oberlin College, Oberlin, Ohio; Ohio Wesleyan University, Delaware, Ohio; and Case Institute of Technology, Cleveland.

The plan, designated as the "binary curriculum", involves three years of study at one of the liberal arts colleges and two years and a summer of work at Case. Upon completion of the graduation requirements of each institution, the student will receive both the bachelor of arts degree and the bachelor of science degree in a specialized engineering field.

Compliments

To GEORGE S. BIDIGARE and R. E. VAN DEVENTER, metallurgists at Packard Motor Co., Detroit, for the award of the third prize in the "Economy in Production" contest sponsored recently by the Ohio Crankshaft Co.

♦ ♦ ♦

E. G. Mahin

To E. G. MAHIN, a past national trustee A.S.M., who recently retired as head of the department of metallurgy at University of Notre Dame, on the receipt of an honorary doctorate degree from Purdue University. His retirement marked the completion of almost 50 years in the teaching profession, the last 25 at Notre Dame, preceded by 23 years at Purdue University, where he received his B.S. in 1901. From 1906 to 1908 he was absent from Purdue on leave to study for his Ph.D. at Johns Hopkins.

♦ ♦ ♦

To WALTER E. LITTMAN on the receipt of the 1950 $50 Esslinger Award as outstanding metallurgical engineering graduate at the University of Cincinnati. The award is given annually by the Cincinnati Chapter A.S.M.

♦ ♦ ♦

To CARL E. SCHMITZ, vice-president and director of engineering, Crane Packing Co., Chicago, on his election as vice-president-at-large of the American Society of Lubrication Engineers.

New Jersey Students Receive Wyzalek Awards

Prizes in the Annual John F. Wyzalek Memorial Award Contest for Proficiency in Heat Treating Were Presented at the May 15th Meeting of the New Jersey Chapter A. S. M. The winners were students in seven local vocational and technical high schools. First prize of $25, second prize of $10, and an honorable mention were awarded the winners from each school. The New Jersey Chapter likewise donated an A. S. M. membership to each of the seven schools. In the center of the back row (sixth from left) is John Ross, chapter chairman; and next to him is Alfred Bornemann, professor at Stevens Institute and chairman of the Award Committee

Radioisotopes Bring New Results in Scientific Research

Reported by H. L. Sittler
Metallurgist, Arcrods Corp.

Radioisotopes are a new scientific tool which offers means of attaining ends not previously possible, according to James P. Graham in his talk before one of the spring meetings of the Baltimore Chapter A.S.M. Mr. Graham is research engineer for Republic Steel Corp.

After a brief description of radioisotopes—what they are, a few of their general and significant properties and general methods of measurement—Mr. Graham spoke of their availability and specific means of detection and measurement. As an example he told how tungsten can be detected in the dendrites of various alloy steels through the use of radioactive paste, tracing the effect, in the finished product, of extremely fine cracks in semifinished steel. Exchange of iron atoms between molten iron and slag, and determination of the diffusion coefficient of one metal into another are other examples of radioactive tracers.

The supervisor of a laboratory handling radioactive isotopes must be especially qualified to understand the safety factors and precautions necessary. The analytical chemist must be trained to handle radioactive elements. More than one person should be designated or allowed to handle all the "hot" work. By exercising proper and reasonable precautions, however, the use of radioactive isotopes is not particularly hazardous.

Miscellaneous applications of radioisotopes, as given by Mr. Graham, include:

1. Use of Cl_{38} in the study of absorption of chlorine by stainless steel.
2. Determination of transit time of gases in the blast furnace with radon gas.
3. Following the distribution of phosphorus; when P_{32} is added to molten steel, the residual P in the solidified metal is easily determined by measurement of its radioactivity.
4. Study of the collector ion in extractive metallurgy.
5. Tracing of sulphur during the coking of coal and its use in iron and steel production. Of the sulphur in blast furnace iron, 66 to 96% comes from the coal. When FeS was mixed with coal and charged into coke ovens, it was found that an exchange of atoms of S occurred between sulphur compounds, and further, that organic and pyritic sulphur appear in the coke in the same ratio as they appeared in the coal. Where a small laboratory oven (400 lb.) was used the results were the same as those obtained when a larger (12-ton) oven was used.

The coffee speaker for the evening was Paul Gundman on "Competitors of a Safety Engineer".

Grinding School Opened

Norton Co., Worcester, Mass., has a new and fully equipped grinding school known as the "Norton School of Grinding". The school is designed to teach the practical application of grinding and allied abrasive processes to the company's sales trainees and plant supervisory personnel, to distributor salesmen, to customer personnel, and to instructors in grinding from engineering, trade and vocational schools.

Stevens Offers Graduate Work

The Graduate School of Stevens Institute of Technology has established a series of graduate assistantships for the year 1950-51, in the fields of chemistry and chemical engineering, physics and metallurgy. A Westinghouse Fellowship in Engineering with a stipend of $1000 a year has also been announced which provides for graduate study in chemical, electrical, mechanical or metallurgical engineering.

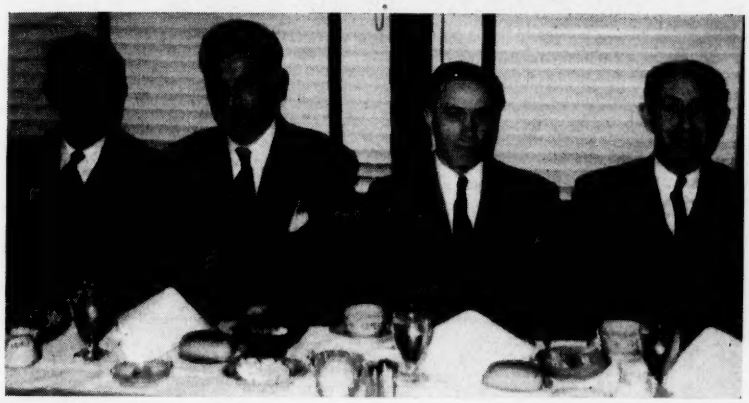
Further information and applications may be obtained from the director of the Graduate School, Stevens Institute of Technology, Castle Point, Hoboken, N. J.

Pouring One for the San Diego Chapter

San Diego Chapter Chairman Les Stark (Right) and Program Chairman Bernard Gross finish pouring of antimonial lead punch on zinc-base alloy die for use in aircraft sheet metal forming. The plant tour at Rohr Aircraft Corp., Chula Vista, Calif., was one of the June activities of the Chapter

A group of members pose after viewing operations of 750-ton double-acting clearing press during the plant visitation (Reported by Bernard Gross, Rohr Aircraft Corp.)

"Unusual" Metals Investigated



Speaker's Table at the April Meeting of the St. Louis Chapter Included, From Left: L. W. Morrell, Revere Copper & Brass, Inc., Chapter Secretary-Treasurer; Louis Malpocker, Lincoln Engineering Co., Chapter Chairman; Bruce W. Gonser of Battelle Memorial Institute, Who Spoke on Some "Unusual" Metals; and Lee G. Grinnell, of Western Cartridge Co.

Reported by H. O. Nordquist
Manager, Alloy & Stainless Steel Dept. Joseph T. Ryerson & Son, Inc.

"Unusual Metals" and new uses for common metals were described in a talk by Bruce W. Gonser of Battelle Memorial Institute before the St. Louis Chapter A.S.M. on April 13 in Alton, Ill.

According to Dr. Gonser, the hope of all research is to leave the world in a better condition than before. To further that aim industry and government combined have more than trebled their expenditures in research in the past ten years. A valuable portion of that increase has been in the field of unusual metals for special applications.

In building improved jet planes, rockets, atomic energy generators and other equipment to withstand severe conditions of temperature, oxidation, corrosion and abrasion, the common materials of construction are just not good enough. Use of an unusual combination of common metals can be very effective, however, as the Germans found in using aluminum-coated steel for certain high-temperature parts in their rockets.

One result of this country's research program is the development of alloys of the new "wonder" metal, titanium, which can develop a greater strength-weight ratio that either steel or aluminum. The armed forces are interested in its development, for it offers remarkable corrosion resistance for naval use and high strength for aircraft use. In a few years the price of titanium will undoubtedly be substantially reduced from its present cost of $5 per lb.

Metals that Dr. Gonser has investigated range from gallium, which will melt in the palm of one's hand, to tungsten, which is used as a filament in incandescent light bulbs. They also range from very soft, easily molded indium to hard, brittle boron carbides and nitrides.

Research for tomorrow offers many unusual schemes, said Dr. Gonser. Stainless steel fibers conceivably may be used for snag-proof hosiery, and atomic power, according to the public press, will be available for submarines and airplanes.

The coffee speaker was C. E. Silk, an explosives expert from Western Cartridge Co., who presented an excellent 15-min. color film entitled "Inside Germany".

Executive Offices Transferred

Executive offices, as well as some manufacturing operations, of the A. F. Holden Co., manufacturers of heat treating baths and pot furnaces, have been transferred to the Detroit branch of the firm to 11300 Schaefer Highway. Manufacturing operations are also being continued at the firm's plant in New Haven, Conn.

Course on Induction Heating

Louisville Chapter A.S.M. sponsored an educational course on "Induction Heating" during the spring. Attendance at the five lectures averaged over 100. Speakers were J. D. Graham of International Harvester Co., Louisville works; Harry B. Osborn, Jr., of Tocco Division, Ohio Crankshaft Co.; M. P. Vore, electronics and X-ray division, Westinghouse Electric Corp.; and Homer F. Kincaid of the Farmall Works, International Harvester Co. The course included a plant trip to the Louisville Works of International Harvester.

Chairman of the Educational Committee that arranged the series is R. B. Liggett of Shuler Axle Co.

THIRTY YEARS AGO

Notes Gleaned From Early Issues of the Proceedings of the Steel Treating Research Society and the Journal of the American Steel Treaters Society, Ancestors of A. S. M.

——30——

Buried in the back of the January 1920 issue of the *Journal,* at the bottom of a page titled "Commercial Items", is the following note: "S. P. ROCKWELL, a member of the American Steel Treaters' Society, has invented a hardness testing machine, which is very practical and is receiving a great amount of publicity and attention." It is, of course, this same Rockwell hardness tester that brought its inventor the Albert Sauveur Achievement Award in 1939.

——30——

A paper by E. E. THUM on "Sulphur and Phosphorus in Steel", presented before the New York Chapter, appears in the *Journal.* Mr. Thum, for the past 20 years editor of our own *Metal Progress,* was then associate editor of *Chemical & Metallurgical Engineering.*

——30——

Standing committees were appointed for the first time by the society early in 1920. There were nine in all, quite similar in scope to those of today. Among the still-familiar names on these committees were CHARLES MORRIS JOHNSON, chairman of the Research and Standards Committee (then and now Crucible Steel Co. of America, Pittsburgh); ARTHUR W. F. GREEN (then chief of laboratory, John Illingworth Steel Co., Philadelphia; now chief metallurgist, Allison Div., General Motors Corp., Indianapolis), on the Meetings and Papers Committee; and GEORGE L. NORRIS of American Vanadium Co. (later Vanadium Corp. of America) on the Constitution and Bylaws Committee.

——30——

HARRY S. BLUMBERG, then assistant metallurgist, Illinois Tool Works and later secretary-treasurer, Chicago Chapter (and now chief metallurgist, M. W. Kellogg Co., Jersey City), was the first technical proofreader for the society's journal.

——30——

"Properties of Manganese Steels" is the title of a paper in the *Proceedings* of the Steel Treating Research Society by JEROME STRAUSS, then listed as assistant chief chemist and metallurgist, U. S. Naval Gun Factory. The author has since switched his allegiance to another alloying element for steel, and is now vice-president of Vanadium Corp. of America in New York City.

T. D. Yensen, Expert On Magnetics, Dies After Retirement

T. D. Yensen

Trygve D. Yensen, who retired from Westinghouse Electric Corp. on June 30, died from cancer on July 2 in Prestwick, Scotland. He was 66 years old, and was enroute to Oslo, Norway, where he planned to spend his retirement.

Dr. Yensen was world-renowned for his contributions to the science of magnetism. His career began at the University of Illinois, where he enrolled in 1903 after coming to America from Norway. While still a student, he showed how the magnetism of iron could be increased greatly and magnetic losses reduced.

In 1916 he came to Westinghouse as a research engineer in the magnetics department. His analysis of the use of carbon in magnetic materials, published in 1924, won worldwide attention. During the years he also invented a series of magnetic alloys known as Hipernik, Hipersil, and Hiperco.

Dr. Yensen is the author of more than 50 papers and was awarded the Howe Medal of the A.S.M. in 1935. His inventions have been granted 12 patents. His most recent contribution to metallurgy and to A.S.M. activities was his chairmanship of the Literature Classification Committee sponsored jointly by the American Society for Metals and the Special Libraries Association, which produced the recently published ASM-SLA Metallurgical Literature Classification.

Clare E. Shugart

Warren Chapter A.S.M. reports the sudden death on April 13 of Clare E. Shugart, while on an inspection tour of the Fisher Body Plant in Cleveland with members of the chapter. Mr. Shugart joined the Thomas Steel Co. some 20 years ago, and for the past 10 years was general foreman of the annealing division of the finishing department.

R. G. McElwee

Richard G. McElwee, 60, manager of the iron foundry division of the Vanadium Corp. of America, with headquarters in Detroit, died suddenly on June 21 at Niagara Falls, N. Y.

Mr. McElwee had a long career in the foundry industry beginning 33 years ago as chief inspector for the Muncie Foundry & Machine Co. Subsequently, he was associated with General Motors Truck Co., American Car & Foundry Co., Whitehead Sales Co., Ecorse Foundry Co., and, for the past 15 years, with the Vanadium Corp. of America.

He was awarded the John A. Penton Gold Medal in 1948 by the American Foundrymen's Society and was past chairman of the A.F.S. Gray Iron Division and chairman of cupola research. He was also chairman of the Casting Panel of the Society of Automotive Engineers and a member of the A.S.M. and A.S.T.M. During World War II, he served on the War Production Board for two years as a consultant on castings.

Tube Fabrication Added

Plans to enter the field of limited fabrication of seamless and welded tubing, in addition to its primary work of manufacturing such tubing, have been announced by the Babcock & Wilcox Tube Co.

The types of fabrication to be handled under the new policy include bending; end-forming such as swaging, upsetting, flaring and expanding; flash-butt welding for safe-ending and making long tubing; and the production of various cross-sections, shapes and other specialties.

Titanium Is Penn State Subject

Left to Right at Penn State Chapter Meeting Are J. E. Baird, Metallurgist for Titan Metal Mfg. Co., Vice-Chairman of the Chapter; R. S. Stewart, the Speaker; and H. J. Read, Associate Professor at Penn State College

Reported by Philip C. Barr, Jr.
Pennsylvania State College

A general picture of the history, occurrence, and present uses for titanium, as well as methods for the extraction and refining of the metal, was presented by R. S. Stewart, speaking before the Penn State Chapter A.S.M. on April 18.

Mr. Stewart, who is the assistant chief of the physical metallurgy division, Titanium Alloy Manufacturing Division, National Lead Co., spoke of the widespread occurrence of titanium, the ninth most abundant element in the earth's crust, and some of the more common ores of the metal. The most important uses of titanium today are as pigment in paint and as an alloying element. In the latter application, it serves as a deoxidizer and carbide stabilizer in steel.

Complete reduction of the stable titanium oxides is virtually impossible to accomplish by pyrometallurgy, Mr. Stewart pointed out. In describing the production of titanium by the Kroll and iodide processes, he discussed the relative values of each process with regard to its economy, as well as the purity and properties of the product.

The high cost of production of titanium today restricts its use in the near future, but the unique properties of the metal indicate an extensive potential use. Titanium is classified as a light metal, having a density between that of iron and aluminum. It also possesses a high melting point, high electrical resistivity, low thermal conductivity, and is extremely corrosion resistant, especially in salt water. The latter property, combined with its high strength will encourage the future use of titanium.

Mr. Stewart concluded his talk by emphasizing the great need for developing better methods for extraction and refinement of titanium at a lower cost. He also stressed the need of extensive research on the alloying of titanium.

Installs New Strip Mills

First step in the modernization of the Riverside Metal Co.'s plant in Riverside, N. J., is the installation of two new, fully automatic, four-high strip mills.

The larger mill will handle coils of copper strip weighing 700 lb. and up to 15 in. wide. Speed is 200 to 600 ft. per min., with reductions from 0.050 to 0.005 in. in thickness. The smaller mill is designed for rolling 9-in. strip from 0.030 to 0.003 in. at a top speed of 700 ft. per min.

Triple Program on Metallography, Wear, Refractory Metals

Reported by F. H. Wright
Chief Metallurgist, Lucius Pitkin, Inc.

Three speakers filled a "request" program at the May meeting of the New York Chapter, A.S.M.

Recent developments in metallography, especially color, were described by R. P. Loveland of the Kodak Research Laboratories, Eastman Kodak Co. Emphasis was placed on analyzing illumination for color metallography in the plane of the image, and using a meter having sensitivity similar to the plate or film. He recommended that the brightest area of the field be measured; with a 10-amp. carbon arc, as frequently used in metallography, this usually can be done with a common light meter. A more sensitive type that anyone can construct was also described.

The new Flexichrome process for making color prints on paper seems to be especially adapted for metallographic specimens, Mr. Loveland stated, because the color pattern of the latter is often simple and the color can be deliberately painted in by the metallographer as he watches the original specimen. In a purely photographic process, the same number of steps must be involved when the pattern is a steel gray containing a few patches of color as when it is one of intricate structure.

Metallurgy and applications of refractory metals, particularly tungsten and molybdenum, were covered by J. H. Dedrick of Sylvania Electric Products Co. Tungsten and molybdenum are reduced from the oxide with hydrogen and the resulting fine powder is pressed into bars.

The bars are sintered in hydrogen atmosphere with heat provided by the electrical resistance of the bar itself; temperatures up to 90% of the melting temperature are reached. Bars are then swaged into wire or rolled to sheet.

Resistance heating for sintering tungsten must be performed in steps at successively higher temperatures, but the wire drawing temperature must be successively reduced as the cross section decreases. The ductility of tungsten decreases after recrystallization, but that of molybdenum increases markedly.

According to the third speaker, A. R. Black of the Shell Oil Co., wear of metals may be classified as cutting by rough surfaces, abrasion by hard particles, galling or scuffing, corrosive wear, pitting, or fretting corrosion.

The lubrication of steel surfaces may be studied in the "four-ball wear machine", in which a rotating steel ball is held in a chuck on a vertical spindle, resting on three stationary balls in a clamping chamber mounted on a self-centering thrust bearing. The tester measures unit pressures, friction and wear, and test periods are usually only 2 hr.

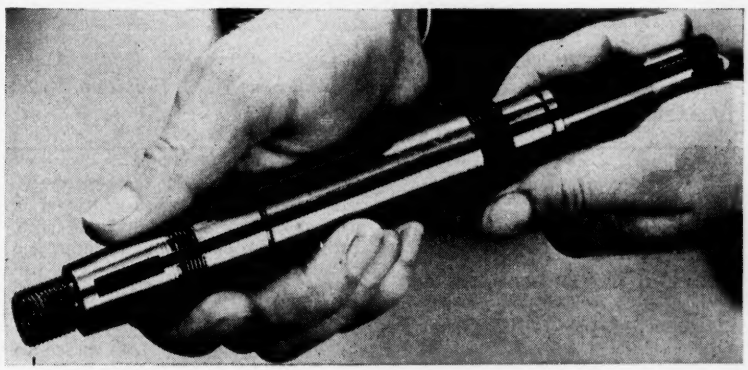
When rubbing surfaces are separated by a film of oil more than 1/40,000 in. thick, the laws of hydrodynamics apply, Mr. Black pointed out. With excessive loads, boundary lubrication breaks down and excessive wear and seizure occur.

Over-polishing of metal surfaces can sometimes prevent wetting with lubricants. Viscosity of oils, operating conditions, type of wear encountered, and "oiliness" as affected by additives must all be considered in choice of lubricants to reduce wear.

Buffalo Has Annual Meeting

Reported by G. F. Kappelt
Metallurgist, Bell Aircraft Corp.

The closing meeting and annual election of officers for the Buffalo Chapter A.S.M. was held at the Bethlehem Supervisors Club on May 11. Preceding the election the chapter presented to 13 members the 25-year certificate honoring continuous membership for that period of time. Their names were listed under the "Quarter-Century Cub" in the April issue of *Metals Review*. Names of the new officers are shown on page 15 of this issue.



New Rycut Alloy Steel Cuts M* Costs 40%

**M stands for all machining and related costs including actual machining time, down-time necessary to re-grind tools and finishing time.*

Here's how:

1. Rycut, a medium carbon alloy, machines 25% to 50% faster than standard alloys of the same type, in either the annealed or heat treated condition.
2. Rycut generally increases tool life 100%—in some cases, as much as 300%.
3. Rycut requires less grinding after hardening due to its better machined surface finish.

These savings have been proved by the shop experience of Rycut users throughout the country as well as by carefully recorded machinability tests. Yet the initial cost of Rycut is practically the same as that of standard medium carbon alloys.

You need no special shop techniques with Rycut. It requires only conventional oil-quench and temper methods of heat treatment; also responds well to flame or induction hardening. And remember, a Ryerson Certificate of analysis and hardenability accompanies every shipment of annealed Rycut to guide its heat treatment.

This money-saving steel is available for immediate delivery — annealed or heat treated — in rounds, flats or squares, in a wide range of sizes. Just call your nearest Ryerson plant for test samples or an initial order. Write for technical bulletin explaining the advantages of Rycut.

Stocks of Carbon, Alloy & Stainless Steels in Most Every Size, Shape & Finish

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JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS LOS ANGELES • SAN FRANCISCO

Head Wichita Chapter for '50-51

Officers of the Wichita Chapter for 1950-51 Are (From Left): A. F. Schroeder, Secretary; R. E. Samuelson, Chairman; C. M. Hamilton, Vice-Chairman; and W. D. Corn, Treasurer. Election was held on May 16

Temperature Effects on Metals, Both Low and High, Covered in Lecture Series

Reported by T. E. Olson
Ohio Crankshaft Co.

Three lectures on the general theme of the effect of temperature on the properties of metals were sponsored by the Detroit Chapter A.S.M. as a "Spring Educational Lecture Series." The speakers were E. J. Ripling of Case Institute of Technology, James W. Freeman of University of Michigan, and Howard C. Cross of Battelle Memorial Institute.

"Properties of Metals at Sub-Zero Temperatures" was the subject of Mr. Ripling's first lecture, presented on March 22. He discussed the various factors that influence the transition temperature of steel and provided some particularly interesting data concerning the effect of prestressing on the ductility of steels at very low temperatures.

The second lecture, presented by James W. Freeman of the University of Michigan, dealt with the very broad subject of "Wrought Materials for Elevated Temperature Service." Dr. Freeman compared the creep and rupture properties of materials varying in analysis from carbon steel to the most recent developed wrought alloys for high-temperature service. Any of the materials commercially available will exhibit a wide spread in their load-carrying ability at high temperature, he pointed out. Prior treatment of the material is an important factor, and the more stable structures give the most consistent results at the higher temperature.

The third and final lecture, presented by Howard C. Cross, was entitled "Cast Materials for High-Temperature Service," with particular attention to the range between 1200 and 2000° F. The speaker first reviewed the properties of the more common high-temperature alloys that have been used in tonnage quantities for years in heat treat furnaces. Cobalt-base precision cast alloys are now being extensively used for turbine buckets. The high-temperature properties of these alloys may vary appreciably from casting to casting, Mr. Cross pointed out. Among the important factors that seem to control these properties are the pouring temperature, mold temperature, cooling rate, and resultant grain size.

IMPORTANT MEETINGS
For September

Sept. 5-9—Chicago Section, American Chemical Society. Sixth National Chemical Exposition, Coliseum, Chicago. (Chicago Section, A.C.S., 86 East Randolph St., Chicago 1.)

Sept. 10-13—American Institute of Chemical Engineers. Regional Meeting, Radisson Hotel, Minneapolis. (F. J. Van Antwerpen, A.I.Ch.E., 120 East 41st St., New York 17.)

Sept. 13-15—Porcelain Enamel Institute. 12th Annual Forum, University of Illinois, Urbana, Ill. (P.E.I., 1010 Vermont Ave., N. W., Washington 5, D. C.

Sept. 18-22—Instrument Society of America. Fifth National Instrument Exhibit, Memorial Auditorium, Buffalo, N. Y. (I.S.A., 921 Ridge Ave., Pittsburgh 12.)

Sept. 19-21—American Society of Mechanical Engineers. Fall Meeting, Hotel Sheraton, Worcester, Mass. (Ernest Hartford, executive assistant secretary, A.S.M.E., 29 West 39th St., New York 18.)

Sept. 26-29—Association of Iron and Steel Engineers. Annual Convention and Iron and Steel Exposition, Public Auditorium, Cleveland. (T. J. Ess, managing director, A.I.S.E., Empire Bldg., Pittsburgh.)

Sept. 27-30—Society of Automotive Engineers. Aeronautic Meeting and Engineering Display, Biltmore Hotel, Los Angeles. (John A. C. Warner, secretary, S.A.E., 29 West 39th St., New York 18.)

The New Executive Committee of the Worcester Chapter Held Its First Meeting on May 17. Seated, from left: Harold B. Bell, Worcester Stamped Metal Co.; Wendell J. Johnson, Massachusetts Steel Treating Corp.; Carl O. Lundberg, Norton Co.; Robert S. Morrow, George F. Blake, Inc. (chairman); and J. Walter Gulliksen, Worcester Pressed Steel Co. (vice-chairman). Standing, left to right: J. Robert Douslin, Wyman-Gordon Products Corp.; Lloyd G. Field, Greenman Steel Treating Co.; Leo P. Tarasov, Norton Co.; Roland E. Ljungquist, Lodding Engineering Corp.; Harold J. Elmendorf, American Steel & Wire Co.; and John R. Dobie, Wickwire Spencer Steel Co. (Photograph by C. Weston Russell)

ROSTER OF ASM CHAPTER OFFICERS

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Vice-Chairman—Dow M. Robinson, 7 Mt. Vernon, East, Weymouth Heights, East Weymouth 89, Mass.
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Acting Secretary-Treasurer—John D. Paine, Jr., 1 Doane St., Marblehead, Mass.

BRITISH COLUMBIA CHAPTER

Chairman—William M. Armstrong, Department of Mining and Metallurgy, University of British Columbia, Vancouver, B. C.
Vice-Chairman — Frank M. Cazalet, 2997 West 39th Ave., Vancouver, B. C.
Secretary—J. C. Christy, 1016 Mainland St., Vancouver, B. C.
Treasurer—C. A. A. Lind, 539 E. Hastings St., Vancouver, B. C.

BUFFALO CHAPTER

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For further details, see *Metals Review,* February 1950, page 4, and *Metal Progress,* May 1950, page 613.

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New Films

Pipe Making

"Steel Arteries for the West", a new 16-mm. industrial motion picture that tells the story of the manufacture of western-made pipe from the mining of the California ore to the rolling of steel into finished pipe has been released by the Kaiser Steel Corp. Arrangements for showings of this 17-min. color and sound film may be made through Kaiser's sales offices in Los Angeles and Oakland, Calif., or by writing to the Public Relations Office, Kaiser Steel Corp., Fontana, Calif.

Oxy-Acetylene Flame

"The Oxy-Acetylene Flame—Master of Metals" is the title of a new 20-minute motion picture on oxy-acetylene welding and cutting. Produced in sound and color, it is the cooperative effort of the International Acetylene Association and the United States Bureau of Mines. The film explains what the oxy-acetylene welding and cutting processes are and what they will do.

Requests to borrow copies of the film should be addressed to the Supervising Engineer, Graphic Services Section, Bureau of Mines Experiment Station, 4800 Forbes Street, Pittsburgh 13, Pennsylvania.

Corrosion Course Scheduled

Nine 2½-hr. lecture periods, with adequate time for discussion, have been tentatively scheduled for a short course on corrosion to be held at Case Institute of Technology Sept. 25 through 29. The course is sponsored by the National Society of Corrosion Engineers, and is designed as a refresher for those engaged in corrosion prevention, yet will not be too advanced for those just entering the field.

The week's program is under the direction of R. B. Hoxeng of Case, and will include as lecturers F. L. LaQue of International Nickel Co.; R. B. Mears of Carnegie-Illinois Steel Corp.; H. A. Robinson, Dow Chemical Co.; Mars G. Fontana, Ohio State University; and W. von Fischer and E. G. Bobalek of Case. Further information may be obtained from R. B. Hoxeng, Case Institute of Technology, Cleveland 6, Ohio.

Scholarship Established

A scholarship has been established at Pennsylvania State College by Heppenstall Co., Pittsburgh, to assist sons and daughters of company employees to secure a college education and a degree in engineering, metallurgy or business administration.

In announcing the scholarship, C. W. Heppenstall, vice-president in charge of operations, said each Heppenstall Memorial scholarship is undergraduate in character, provides a payment of $375 a semester for not more than eight semesters, and the first recipient will be selected during the summer of 1950.

Georgia's 1950-51 Program Covers Regional Industry

The 1950-51 series of technical meetings of the Georgia Chapter A.S.M. will depart from conventional procedure. Instead of having programs that feature recognized national authorities in the various metalworking fields, the Georgia Chapter, according to current plans, will present a series of eight meetings on "Metalworking—Southeast".

Diversified metalworking plants in the Southeast will be invited to participate in the program. Engineering, operating and sales personnel from each plant will discuss their company's products, metalworking operations involved in their production, and applications of their finished or semifinished products. Emphasis will be placed on metalworking procedures and methods, utilizing techniques to cut production and maintenance costs. When possible, industrial training films will be used to support the program.

One result of this unusual approach to society programs will be to recognize the increasing diversification of southeastern metalworking operations, and to acquaint engineering personnel with the most recent developments.

Quality Control Course Offered

An advanced course in "Quality Control by Statistical Methods" is being sponsored by the Technical Extension Division of Purdue University. Sept. 8 through 16, 1950. The course is designed for those who have already had preliminary instruction in quality control and who want to learn more about the statistical approach to industrial problems.

Enrollment will be limited to 50, and tuition is $100 per person. Application for enrollment or requests for further information should be addressed to Technical Extension Division, Purdue University, West Lafayette, Ind.

Expansion Program Announced

The Youngstown Sheet and Tube Co. plans to build four new open-hearth furnaces and other facilities at its Indiana Harbor plant at East Chicago, Ind. The new furnaces, with necessary facilities, will produce 550,000 to 600,000 tons of ingots per year.

After these furnaces are in operation, the bessemer department at Indiana Harbor will be discontinued. A new roll shop will be erected and finishing facilities will be added for hot rolled sheets and strip.

North Texas Hears About Noise and Vibration

Reported by Arthur C. Willis
Instructor
Southern Methodist University

(Photograph on page 16)

"Noise & Vibration Problems in Industry" presented by Robert O. Fehr, section engineer for General Electric Co., featured the annual meeting of the North Texas Chapter A.S.M. on May 17. Following the dinner, ballots for the election of officers were counted, and the new officers were introduced to the group.

Dr. Fehr stressed that noise is simply undesirable sound. Since noise is a result of vibration, most attempts at noise reduction have been aimed at the suppression of frequencies in the audible range. However, it has been found that vibration at frequencies below the audible range can cause severe discomfort.

In vibration studies of machines or other structures, every attempt must be made to prevent the application of forces in resonance with the natural frequency of the structure, or any part of it. Failure to do so too often results in fatigue failures in machines, or in the collapse of structures, as in the Tacoma Narrows Bridge.

Flood Victims Aided

During the recent disastrous floods in Manitoba, many A.S.M. members were helped by the donation of a check for $100 to the Manitoba Flood Relief Fund by the national office of the American Society for Metals.

Want a chance AT 9,146 NONFERROUS BUYERS?

Out of the more than 30,000 Metals Engineers—executives and buying officials—nearly one-third of them will be interested in nonferrous metals. For example—9,395 will be interested in Aluminum; 8,221 in Brass and Copper; 4,128 in Lead and Magnesium; 6,085 in Powder Metals and 4,164 in Zinc. If you have anything to sell to the metal industry, be among the 400 leading firms that will display their products at the 1950 Metal Show. Write, wire or phone UTah 1-0200, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

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A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor
Assisted by Pauline Beinbrech, N. W. Baklanoff, Fred Rothfuss, and Leila M. Virtue

A GENERAL METALLURGICAL

188-A. Review of the Metals and Minerals. *Mining Journal.* (Annual Review Number), May 1950, p. 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25-29, 31, 33.

Economic survey includes the following: "Gold", E. Baliol Scott; "Silver" (anon.); "Platinum Metals" (anon.); "Copper" and "Tin", E. Baliol Scott; "London Metal Market" (anon.); "Lead" and "Zinc", E. Baliol Scott; "Magnesium", Ralph F. Batty; "Aluminium", Cyril S. Fox; "Nickel" (anon.); "Beryllium", Ralph F. Batty; "Titanium" (anon.); "Manganese", Cyril Fox; "Wolfram, Molybdenum, and Vanadium", Ralph F. Batty; and "Iron and Steel Trade" (anon.) (A4)

189-A. Reclamation of Small Accumulations of Nickel and Cobalt. C. C. Downie. *Mining Journal,* v. 234, June 9, 1950, p. 598-599.

Recommended recovery procedures for the scrap-metal refining plant. (A8, Co, Ni)

190-A. Integrated Operations for Production of Diverse Products. *Production Engineering & Management,* v. 25, June 1950, p. 63-70.

Manufacture of washing-machine tubs. Includes shearing, deep drawing, annealing, forming, enameling, and inspection.
(A5, G general, T10, CN)

191-A. The Organization of Iron and Steel Research in Russia. *Metal Progress,* v. 57, June 1950, p. 772-773. From an article by G. Delbart, *Revue de Métallurgie.*

Quotes from Delbart's article (see item 25A-137, 1949) are followed by editorial remarks concerning the publication of Russian metallurgical papers. Includes analysis of Russian publications surveyed in ASM Review of Metal Literature.
(A9, Fe, ST)

192-A. Welding Products Reference Number. *Welding Engineer,* v. 35, Mid-June 1950, 116 pages.

Statistical section, buyers' guide, and trade-name section.
(A10, K general)

193-A. Should Zinc Enter the U. S. Duty Free? *Metals,* v. 20, June 1950, p. 8-12.

Debate in print. Affirmative is argued by Norman Hickman of American Metal Co., Ltd.; negative by Ernest V. Gent, American Zinc Institute. (A4, Zn)

194-A. Cleaning of Stack Gases From Calcining and Melting Operations. John M. Kane. *Chemical Engineering,* v. 57, June 1950, p. 269-270.

Discusses various methods.
(A8, B15, C21)

195-A. Steel: Slag and Pickle Liquor Get Together. S. S. Heide. *Chemical Engineering,* v. 57, June 1950, p. 286.

New process in which molten blast-furnace slag poured into the waste pickle liquor evaporates water, neutralizes acidity, granulates the slag, and produces a porous product which can be dried, crushed, and used to reduce the acidity of raw commercial fertilizer mixtures and prevent caking. (A8, ST)

196-A. Strategic and Critical Minerals; The U. S. Stockpile Program. John D. Morgan, Jr. *Canadian Mining Journal,* v. 71, June 1950, p. 51-54.
(A4)

197-A. Metalworking: What It's Doing—What To Expect. *Steel,* v. 127, July 3, 1950, p. 53-60.

A statistical report and forecast.
(A4)

198-A. Electrolytic Dissolution of Copper in Ammoniacal Electrolytes. Fred A. Schimmel. *Journal of Physical & Colloid Chemistry,* v. 54, June 1950, p. 841-847.

It is known that copper can be dissolved electrolytically in ammoniacal electrolytes. A process has been used recently for the recovery of copper from copper-plated iron scrap. Conditions under which copper can be dissolved anodically in the cuprous form and also deposited cathodically from the monovalent state using an ammoniacal electrolyte. (A8, L17, Cu)

199-A. A Survey of the Aluminum Industry in Post-War Germany. B. M. Pearson. *Light Metal Age,* v. 8, June 1950, p. 15-16. Based on article in *Revue de l'Aluminum.*
(A4, Al)

200-A. Mechanization of Technical Processes in Ferrous Metallurgy. (In Russian.) A. B. Chelyustkin and B. A. Levitanskii. *Promyshlemnaya Energetika* (Industrial Power), v. 7, Mar. 1950, p. 3-6.

Progress to date in mechanization of rolling mills and other operations connected with ferrous metallurgy. (A5, F23, Fe)

201-A. Reducing the Generation of Waste: A Cost-Cutting Technique. W. E. Casey. *General Electric Review,* v. 53, July 1950, p. 13-17.

Various aspects as applied to industrial production. Includes standardization, effective planning, improved technique, conservation of valuable materials, discriminating purchase, and scrap disposal. Illustrated by examples of inefficient and efficient layout for punch-press operation. (A8, G2)

202-A. Air Pollution—A Major Problem for Industry. Pollution. Henry F. Hebley. **Stack Sampling.** Leslie Silverman. *Iron Age,* v. 166, July 13, 1950, p. 84-89.

Companion articles are abstracts of papers given before the First National Air Pollution Symposium, Pasadena, Calif., Nov. 10-11, 1949. A table compares devices used for stack, effluent, and aerosol sampling. 40 ref. (A7)

203-A. Bethlehem Embarks on Major Modernization Program at Johnstown Plant. Arthur B. Homer. *Iron and Steel Engineer,* v. 27, July 1950, p. 132, 134.
(A5, D general, ST)

204-A. Blast-Furnace Slag as Filler for Concrete. (In German.) Alfred Schneider-Arnoldi. *Stahl und Eisen,* v. 70, May 25, 1950, p. 464-465.

Blast furnace slags are excellent fillers for concrete, especially used in the building of homes. Such concretes combine light weight with high insulating properties.
(A8, D1)

205-A. Liquation of Iron and Manganese From Aluminum-Alloy Scrap. (In German.) A. Buckeley. *Metall,* v. 4, June 1950, p. 235-239.

Combines a review of the literature with results of experiments, showing that the Fe content in Al alloy scrap can be reduced to a tolerable amount by addition of Si, Cu, Zn, or Mn to the melts. The complete and the partial refining of scrap Al alloys. 28 ref. (A8, Al)

206-A. (Book) Engineering Metallurgy. Alexander P. Gwiazdowski. 246 pages. C. C. Nelson Publishing Co., Appleton, Wis. $4.

Short items on a wide variety of subjects; might be considered a handbook treatment. Can be used for selection of materials and heat treatments and writing engineering specifications. Chapters on such topics as: Static and dynamic properties of metals, applications of SAE steels, heat treatment of ferrous materials, tool materials, processing of rolled steels, castings, and bearing metals. (A general)

207-A. (Book) The Organization of Industrial Scientific Research. Ed. 2. C. E. Kenneth Mees and John A. Leermakers. 383 pages. 1950. McGraw-Hill Book Co., 330 West 42nd St., New York 18.

First edition was published in 1920; present text is an essentially new book. History and development of industrial scientific research, the general principles of its conduct, and an analysis of methods actually used for the organization and operation of industrial research laboratories. Experience of the authors has been chiefly in the fields of chemistry and physics. (A9)

208-A. (Book) Economic Survey of Latin America, 1948. 279 pages. 1949. United Nations, Department of Economic Affairs, Lake Success, New York.

Divided into two main parts: trends in production and other economic aspects. First part: Manufac-

turing, the construction industry, mining, and agriculture. Part 2: Population characteristics, transportation, foreign trade, balance of payments, the inflationary process, and Latin America and European recovery. (A4)

209-A. (Book) **European Steel Trends in the Setting of the World Market.** 148 pages. 1949. United Nations, Department of Economic Affairs, Steel Division, Economic Commission for Europe, Geneva, Switzerland.

An extensive study containing numerous tables and graphs. (A4, ST)

210-A. (Book) **ASM-SLA Metallurgical Literature Classification.** T. D. Yensen, chairman. 49 pages + about 130 looseleaf punched sheets. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Booklet: $1.00; Workbook, $3.00.

Full details of new classification system for metallurgical literature prepared by a joint committee of American Society for Metals and Special Libraries Association. Application to classifying and indexing the metallurgical literature and to a punched-card filing system for personal or library use (sample card included.) Explains new classification and coding system used by "A.S.M. Review of Metal Literature". Includes alphabetical index relating metallurgical terms to code number. Purpose of the "Workbook" is to provide a ready means of expanding the classification and adapting it to individual needs. (A10)

B

RAW MATERIALS AND ORE PREPARATION

204-B. The Trend in Mineral Dressing. F. B. Mitchell. *Mining Journal* (Annual Review Number), May 1950, p. 73, 75, 77, 79.

A review. (B13, B14)

205-B. Some Recent Work on Flotation. Graham Oldham. *Mining Journal* (Annual Review Number), May 1950, p. 81, 83-84.

A review. 27 ref. (B-14)

206-B. Geology of the Fissionable Materials. George W. Bain. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 45, June-July 1950, p. 273-323.

Deposits of uranium and thorium have characteristics of mineralogy and geologic occurrence with geographic distribution pattern that facilitate estimating the resources of each type. Aggregate abundance in the earth is about that for tin; and theoretical difficulty of recovery from large deposits would appear to be slightly less than for silver. At present the primary deposits are the principal source of supply. For the future, all varieties of sedimentary occurrences give promise of large sustained production at reasonable cost. 162 ref. (B10, U, Th, EG-h)

207-B. Carbon Disintegration Test for Blast Furnace Fire Brick. *Industrial Heating,* v. 17, June 1950, p. 1056, 1058, 1065. Condensed from paper by Louis J. Trostel.

Apparatus and procedure. (B19)

208-B. The Beneficiation of Southern Iron Ores. E. H. Rose. *Mining Congress Journal,* v. 36, May 1950, p. 32-35, 60; June 1950, p. 44-47, 83.

See abstract of "Beneficiation Methods for Southern Iron Ores", *American Iron and Steel Institute,* "Technical Committee Activities." See item 32-B, 1950. (B14, Fe)

209-B. A Gold Treatment Plant. *Engineer,* v. 189, June 2, 1950, p. 654-655.

Diagrams show floor plan and elevation of plant in operation at the El Sid mine in Egypt. Crushing, ball milling, classification, amalgamation, and cyanidation are the principal operations. (B13, C24, C29, Au)

210-B. The System Gehlenite-Spinel; Relation to the Quaternary System CaO-MgO-Al_2O_3-SiO_2. R. W. Nurse and N. Stutterheim. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 137-138.

Experimental data. The above systems occur in blast-furnace slags. (B21, D1, Fe)

211-B. Amalgamation, Cyanidation and Filtering Tests on an Ore From G.M.L. 5767, Red Ridge, Coolgardie, W. A. Arnold Griffin, Evan E. Hughes, and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines* (Joint Investigations), Report No. 338, Aug. 19, 1949, 5 pages.

With respect to recovery of gold from the ore. (C24, C29, B14, Au)

212-B. Treatment of an Ore From Gabanintha by Flotation and Gravity Concentration. Arnold Griffin, Evan E. Hughes, and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines* (Joint Investigations), Report No. 413, Aug. 30, 1949, 7 pages.

Recovery of Au and Cu from the ore. (B14, Au, Cu)

213-B. Experience With the Flotation of Cassiterite. A. Graham Thomson. *Mining Journal,* v. 234, June 16, 1950, p. 625-627.

Reviews work of past 10-12 years. (B14, SN)

214-B. Present and Prospective Sources of Supply of Steel Making Raw Materials. C. C. Henning and R. W. Braund. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 804-806, 844. (B10, Fe)

215-B. Investigation of Smuggler Lead-Zinc Mine, Aspen, Pitkin County, Colo. M. E. Volin and J. H. Hild. *U. S. Bureau of Mines,* Report of Investigations 4696, June 1950, 47 pages.

Results of beneficiation tests. (B10, B14, Pb, Zn)

216-B. The Rarer Metals. W. H. Dennis. *Mine & Quarry Engineering,* v. 16, June 1950, p. 173-178; July 1950, p. 211-215.

Sources and preparation of Li, Cs, Rb, Be, In, Tl, and Th. Second part deals with Zr, Ge, Ta, Cb, Se, and Te. (B general, EG-b)

217-B. Recent Progress in Refractories. II. Magnesia. J. H. Chesters. *Ceramic Age,* v. 55, June 1950, p. 396, 398.

Second of series. Fundamental developments and practical applications, particularly to the openhearth and other metallurgical furnaces. (B19, D2)

218-B. The Present Status of the Suspension Roasting Process. (In German.) Gotthard Björling. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Apr. 1950, p. 111-115.

Suspension and flash roasting of iron ore. (B15, Fe)

219-B. Critical Investigation of Classification of the Process in Rake Classifiers. (In German.) Günther Flügge. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Apr. 1950, p. 116-121.

Object of experimental study was to find generally valid principles. A new "flow-number" formula can be used to determine optimum operating conditions. A new "slotted" baffle wall which increases the efficiency of the classifier about 75%. (B13)

220-B. Influence of Grain Characteristics in Flotability of Zinc Blende in Connection With Auto-Activation. (In Russian.) I. N. Plaksin, G. N. Khazhinskaya, and T. F. Brovkina. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 407-411.

Above was experimentally investigated for zinc blende ground to −100, −200, −250, and −325 mesh and containing 50.44% Zn, 0.23% Cu, and 7.64% Fe, using $CuSO_4$ as activator and lime as frother. (B14, Zn)

221-B. Influence of Frothing Agent on Air Content of Flotation Pulp. (In Russian.) O. S. Bogdanov, B. V. Kizeval'ter, and S. G. Maslova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 412-416.

Investigation revealed that a frothing agent influences the concentration of air in the pulp, on the one hand, by decreasing the rate of ascent of the bubbles and, on the other hand, by preventing their coalescence. Experimental apparatus. (B14)

222-B. Laboratory Experiments on Beneficiation of Brown Hematite by Means of Heavy-Liquid Separation. (In Russian.) V. I. Lukashin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 919-920.

Results of investigation for a hematite ore containing 33.48% Fe, 20.67% SiO_2, 10.74% Al_2O_3, and 2.55% $CaO + MgO$, using a heavy liquid of specific gravity 3.2. (B14, Fe)

223-B. How Getchell Mine and Mill Prepare for Greater Output. John B. Huttl. *Engineering and Mining Journal,* v. 151, July 1950, p. 60-62.

Major changes in mine and mill for processing 1500 tons per day of sulfide gold ore. Includes flowsheet of crushing, grinding, classification, beneficiation, cyanidation, etc. (B general, Au)

224-B. Heavy-Density Separation Cuts Brown Ore Treatment Cost. S. A. Britton. *Engineering and Mining Journal,* v. 151, July 1950, p. 68-70.

Limonite, previously rejected because of low yield and high insoluble content, can now be beneficiated economically. (B14, Fe)

225-B. Clean Design Features New C & H Lead-Zinc Mill. I. V. Korts and O. W. Walvoord. *Engineering and Mining Journal,* v. 151, July 1950, p. 78-81.

New mill of Calumet and Hecla Consolidated Copper Co., at Shullsburg, Wis. Includes flow diagrams. (B13, Pb, Zn)

226-B. Recent Progress in Refractories. J. H. Chesters. *Research,* v. 3, July 1950, p. 303-309.

A survey. 27 ref. (B19)

227-B. Protective Action of Ammoniacal Compounds During Selective Flotation of Pyrite and Arsenopyrite. (In Russian.) *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 1, 1950, p. 97-99.

Investigated using ammonium carbonate, nitrate, or chloride as additives during flotation tests on a synthetic mixture of arsenopyrite and pyrite of 1-3 ratio. Tabulated data indicate that the highest extraction of arsenopyrite (92-93%) was achieved when NH_4Cl was used (5 kg. per ton). (B14)

228-B. (Book) **Hochofen-Schlacke.** (Blast-Furnace Slags.) Fritz Keil. 346 pages. Stahleisen, Dusseldorf, Germany. 32.50 marks.

Slags of all types and compositions. Differences between the properties of blast furnace and other slags are emphasized. Production and utilization of quickly cooled

slag; production of granulated slag, its use for cement, for brick-making, and for the making of slag-pumice stone. Miscellaneous products and uses, such as production and use of slag wool, use of slag as fertilizer, as filler for worked-out sections of mines, and as ingredient in the making of glass. Extensive bibliography. (From review in *Chemical Engineering.)* (B21, D1)

C

NONFERROUS EXTRACTION AND REFINING

73-C. Development of Mechanical Puncher at the McGill Smelter. Leonard Larson. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 929-932.

Equipment designed to punch the tuyeres of copper converters, otherwise a difficult, disagreeable, and hazardous job. (C21, Cu)

74-C. Natural Gas Supplies Power To Make Aluminum. *Steel,* v. 127, July 3, 1950, p. 102, 104.

Low-cost electric power sources at Alcoa's Point Comfort Works increase aluminum production by 114 million pounds. (C23, Al)

75-C. Electrothermal, Electrolytic, and Electrostatic Processes, and Electric Welding; A Review of Progress. J. W. Cuthbertson. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. I, Mar. 1950, p. 43-60.

Covers principally a wide variety of metallurgical processes in which electricity is applied for smelting, refining, melting, heat treatment, electrolytic extraction of metals, electrodeposition, electropolishing, resistance and arc welding. Also electrolytic production of gases and electrostatic precipitation processes. 67 ref.
(C21, C23, D5, J2, K1, K3, L17, L18)

76-C. Electrically-Operated Gold Cyanidation Plant. *Engineering,* v. 169, June 9, 1950, p. 649.

Equipment and procedures at El Sid gold mine in Egypt. (C24, Au)

77-C. "Alsithermic" Metallurgy. (In French.) Arturo Paoloni. *Journal du Four Electrique et des Industries Electrochimiques,* v. 59, Jan.-Feb. 1950, p. 18-20; Mar.-Apr. 1950, p. 44-46.

Discusses the possibility (on the basis of experimental investigations) of reducing various metallic ores using as reducing agent an alloy prepared in the electric furnace composed of 50% Al, 35% Si, 10% Fe, and 3% Ti. Such an alloy is readily obtainable from bauxite. Second part: "Alsithermic" reduction of roasted pyrites, of a manganese ore, and of a titanium ore. Production of synthetic corundum free of titanium. (C26)

78-C. Thermal Reduction of Alumina. (Importance of Rate of Heating on Results of the Reduction Process.) (In German.) E. J. Kohlmeyer and S. Lundquist. *Zeitschrift für anorganische Chemie,* v. 260, Dec. 1949, p. 208-230.

In the reduction of alumina with carbon, the undesirable formation of Al_4C_3 can be greatly reduced by melting the Al_2O at the fastest possible rate. To prevent evaporation of Al and carbide, the temperature must be limited to 2100-2200° C. Reduction of Al_2O_3-SiO_2 mixtures. Al-carbide constitution diagram. 24 ref. (C21, Al)

79-C. Research on the Deposition of Electrolytic Manganese. I. (In Polish.) M. Perec. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 131-138.

Fundamental principles of the production of electrolytic manganese. Ammonia and ammonium salts displace the curve of cathodic polarization toward negative potential values. Current efficiency is graphed as a function of NH_4 and Mg salt concentration and of temperature of electrolysis. Influence of inhibitors on the course of electrolysis. 17 ref. (C23, Mn)

80-C. Cementation (Deposition) of Cobalt From Aqueous Solutions by Metallic Zinc. (In Russian.) D. M. Chizhikov and B. P. Kreingauz. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 394-400.

Separation of Co from Ni by deposition on Zn is possible only when the Co concentration in the solution exceeds by at least twice that of Ni, at initial Co concentration of 1 g. per liter. Influence of temperature change and of different Co concentrations on kinetics of the process of electrodeposition of Co. Method of investigation.
(C23, Co, Zn)

81-C. Vacuum Metallurgy—A New and Growing Industry. A. W. Schlechten. *Engineering and Mining Journal,* v. 151, July 1950, p. 71-73.

Applications to reduction of Mg, Ca, Na, Li, and Ba ores and compounds. Possible application to reduction of Zn by vacuum reaction with Fe, to reduction of nonvolatile metal compounds (metal remains in place), to separation of metals from alloys by vacuum distillation, to vacuum casting, and other possibilities. (C25)

82-C. Improvements in the Electrowinning of Chromium. R. R. Lloyd, J. B. Rosenbaum, V. E. Homme, L. P. Davis, and C. C. Merrill. *Journal of the Electrochemical Society,* v. 97, July 1950, p. 227-234.

Improvements in electrowinning of Cr from trivalent or "chrome alum" solutions, made since publication of a previous paper. Elimination of sodium sulfate from the electrolyte and changes in cell design have decreased the cost. Sensitivity of laboratory-size cells to certain critical impurities and other variables tends to obscure possibilities of this type of electrolyte. Research in pilot-plant cells shows that proper cell design and operation on a sufficiently large scale can largely overcome the sensitivity of chromium sulfate electrolytes to impurities and, to a lesser extent, to pH and other variables. (C23, Cr)

83-C. The Production of Beryllium. (In German.) Gustav Jaeger. *Metall,* v. 4, May 1950, p. 183-191.

Production methods, from reduction of Be compounds to refining of the metal. The most recent processes, namely chemical and electrolytic, are described in detail. Numerous references (mostly to patents). (C23, C general, Be)

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D

FERROUS REDUCTION AND REFINING

188-D. The All-Basic Open Hearth: European and American. R. P. Heuer and M. A. Fay. *Journal of Metals,* v. 188, June 1950, p. 824-829; July 1950, p. 921-928.

Compares operating practices; furnace bindings, bottoms, back and front walls; and silica and basic roof construction. Basic refractories used in the openhearth roof, ports, and ends; construction of slag pockets and regenerators; fuel practices; and direct comparisons between furnaces of various design. Part Two. Research and development completed as well as that planned in basic refractories and their applications. (D2, Fe)

189-D. Electric Arc Furnace Steel Quality. Robert Sergeson. *Iron and Steel Engineer,* v. 27, June 1950, p. 100-103; discussion, p. 103-104.

Equipment and its sizes. Types of electric-furnace steels and process used for each; factors influencing quality, and tests for determining quality. (D5, ST)

190-D. Blast Furnace Gas Boosts Steam Plant Output. P. J. Berg. *Industrial Heating,* v. 17, June 1950, p. 1010, 1012, 1014, 1016.

Steam generating capacity was increased by approximately 200,000 lb. of steam at 165 psi. and power output by 7500 kw. without increasing fuel costs by utilizing approximately 2,500,000 cu.ft. daily of 110-B.t.u. per cu.ft. blast-furnace gas that previously had been wasted to the atmosphere. (D1, A8)

191-D. Session on Basic Open Hearth Quality and Metallurgy at Silver Anniversary Open Hearth Conference. II. (Concluded.) B. B. Rosenbaum. *Industrial Heating,* v. 17, June 1950. p. 1018, 1020, 1022, 1024.

Concludes summary of conference proceedings. Oxidation in tapping and ladle filling; furnace practice, such as bath temperature measurement and control: and conservation of manganese. (D2, ST)

192-D. The Use of Coke in Blast Furnaces. T. Sanderson and D. R. Wattleworth. *Journal of the Institute of Fuel,* v. 23, May 1950, p. 115-120.

Attempts to show that coke plays another role in blast-furnace operation than acting as the source of heat and reduction; and to assess quantitatively the physical properties of coke in relation to its use in the furnace. Presents findings of a statistical survey of the effect of coke quality on coke consumption. By improvement of coke quality, furnace output was increased 22%. (D1, Fe)

193-D. The Reduction of Lump Ores. R. Wild and H. L. Saunders. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 198-214.

The over-all rate of heat transfer to the center of iron-ore lumps and the penetration of gaseous reduction. Effects of various factors upon rate of heat transfer are assessed; and the temperature lag at the center of lumps heated at a uniform rate is related to their size. Specimens of a wide range of ores were subjected to reduction by blast-furnace gas under standardized conditions. Oxygen gradient from the surface to the center was found by chemical analysis. The extent of the penetration of reduction is related

to porosity of the ore which is, in general, the factor limiting reduction within the lump. 22 ref. (D1, Fe)

194-D. Improved Stainless Steel Smelting; Oxygen Lancing Reduces Chromium Loss. *Chemical Age,* v. 62, June 3, 1950, p. 819-820.

Process just developed by British steelmakers for the electric arc furnace. (D5, B22, SS)

195-D. Low-Temperature Coke as a Reactive Carbon. C. E. Lesher. *Mining Engineering,* v. 187, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 805-810.

Results of a study of the reactivity of 950 and 1650° F. cokes as measured by relative rates of reduction of iron oxides at temperatures up to 2200° F. Three standardized combinations of Lake Superior brown iron ore with carbon were tested by similar procedures. 18 ref. (D1, B22, Fe)

196-D. Radioactive Tracers for Gas Transit Times. *Iron Age,* v. 166, July 6, 1950, p. 96.

New technique. (See abstract of "A Radio-Active Technique for Determining Gas Transit Times in a Driving Blast-Furnace", E. W. Voice, *Journal of the Iron and Steel Institute,* item 2B-319, 1949.) (D1, S19, Fe)

197-D. The Theory, Equipment and Operation of Lime Injection Through the Tuyeres of a Blast Furnace. George Steudel. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 775-778.

The purpose of lime injection is twofold; to reduce undesirable lime content in the bosh slag and to give immediate control to the hearth slag composition. (D1, Fe)

198-D. Use of Oxygen in Electric Alloy-Steel Production. *Engineering,* v. 169, June 9, 1950, p. 660-661.

Process which has permitted the production of high-grade austenitic stainless steels in carbon-arc furnaces from scrap material. A long steel tube, or "lance" is used to pass oxygen through the melts to remove, by oxidation, carbon and such elements as Si and Mn without, at the same time, causing heavy losses of Cr as a result of oxidation. (D5, B22, AY)

199-D. The Use of Oxygen in Steelmaking; Recent British Developments With Electric Furnaces. *Metallurgia,* v. 42, June 1950, p. 29-32. (D5, B22, ST)

200-D. The Use of Oxygen in Steelmaking. *Engineer,* v. 189, June 16, 1950, p. 717-718. (D general, B22, ST)

201-D. "Checkerwork" of the Modern Cowpers Stove. (In French.) M. Gérin. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 295-304; discussion, p. 304-305.

Analyzes conditions of checkerwork utilization in Cowpers blast-furnace stoves. Several types of checkerwork were comparatively investigated. (D1, Fe)

202-D. Cowpers Stoves in French Metallurgical Industries. (In French.) V. Rémond. *Revue de Métallurgie,* v. 47, May 1950, p. 365-387; discussion, p. 387.

Comprehensive information concerning operation during 1948 and 1949. Conclusions concerning the type of Cowpers stove most suitable to French conditions. The various types, including checkerwork design and choice of refractories. (D1, Fe)

203-D. Slag Control in the Basic Openhearth Process. Part II. (In Polish.) A. Ludkiewicz, E. Bucko, and J. Zieba. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 155-161.

Further investigation of slag patterns resulted in completion of the series for the basicity range 2.0-3.2. Basicity evaluation by examination of top and bottom surfaces of the slag pancakes proved to be satisfactory in comparison with results calculated on the basis of chemical analysis. Mineralogical examination of thin sections of slag by polarized light, also examination of thin sections in reflected light, made it possible to differentiate three types of basic openhearth slag. (D2, ST)

204-D. Basic Steelmaking; A Survey of the Physical Chemistry of Sulphur. C. E. A. Shanahan. *Iron and Steel,* v. 23, June 1950, p. 279-283.

The concepts of activity and free energy. Structure of slags, desulfurization by basic slags, and basicity of slags. (To be continued.) (D general, P12, B21, ST)

205-D. The Application of Slag Control to the Manufacture of Tube Steel. J. Monaghan. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 27-53; discussion, p. 53-70.

Objects of slag control, estimation of slag basicity, slag-control procedure, experimental investigations on bank erosion, and application of slag control to various steels. Methods are illustrated by detailed calculations. (D general, B21, ST)

206-D. A Statistical Investigation of Cracking in Basic Open Hearth Ingots. I. M. Mackenzie and A. J. Donald. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 71-89; discussion, p. 90-97.

Statistical analysis shows that furnace practice has a considerable influence. The most important factors contributing to variance of the cracking index were found to be: tapping temperature; temperature during refining; phosphorus content; sulfur content; and teeming speed. (D2, S12, ST)

207-D. A Materials and Thermal Balance on a Modern Blast Furnace. J. Taylor, R. P. Towndrow, and J. D. Gilchrist. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 126-144.

Equipment and procedures. A team of 36 men was required to make the necessary tests which were conducted over a period of 1 week. Raw-material sampling, slag and metal sampling, gas sampling, and temperature determinations on slag and metal were carried out. (D1, Fe)

208-D. Scrap Preparation and Furnace Charging as Related to Cold Metal Open Hearth Shops. W. A. Johnson. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 145-168; discussion, p. 168-170.

Not concerned with history or present status, but with possible improvements from physical and mechanical viewpoints. Alternative equipment designs and methods for improving charging rate; improved scrap-preparation methods; and use of the cupola for melting scrap. Potential cost savings resulting from the latter. (D2, A8, ST)

209-D. Possibilities of Reducing Coke Consumption in the Production of Iron and Steel. (In German.) Magnus Tigerschiöld. *Stahl und Eisen,* v. 70, May 11, 1950, p. 397-403.

Various methods for reducing coke in the blast furnace. Evaluates the sponge-iron and Krupp processes. 22 ref. (D1, D8, Fe)

210-D. Efficiency Data on Electric Steel Furnaces With Inside Diameters Greater Than 3600 Mm. (In German.) Friedrich Badenheuer. *Stahl und Eisen,* v. 70, May 11, 1950, p. 403-409.

Quantitative results of a study of optimum charges, melting methods, and conditions in electric-arc furnaces. Special attention is given to the chromium charge and to the recovery of Cr from the slag. 17 ref. (D5, ST)

211-D. Plant Experiences in the Production of Bessemer Steel in a Small Converter. (In German.) Erich Lanzendörfer. *Stahl und Eisen,* v. 70, May 11, 1950, p. 409-416.

See abstract of "Evaluation of the Bessemer Process in the Small Converter," *Neue Giesserei,* item 141-D, 1950. (D3, ST)

212-D. Increasing the Capacity of Electric-Arc Steel Furnaces by Use of Solid Charges. (In German.) Edmund Pakulla. *Stahl und Eisen,* v. 70, May 25, 1950, p. 445-452.

Various factors that affect furnace output, and methods of increasing melting rate. Performance data are tabulated and graphed. (D5, ST)

E

FOUNDRY

287-E. How To Build Strength Into Large Patterns. Alfred E. Wells. *American Foundryman,* v. 17, June 1950, p. 38-39. (E17)

288-E. Auxiliary Oxygen Applied in 72 Inch Production Cupolas. F. J. Webbere. *American Foundryman,* v. 17, June 1950, p. 40-44.

Presents results of a series of large-scale tests sponsored by the Chevrolet Grey Iron Foundry, Saginaw, Mich. (E10, B22, CI)

289-E. Poll Shows Principal Causes for Defective Aluminum Sand Castings. W. E. Mahin and R. A. Lubker. *American Foundryman,* v. 17, June 1950, p. 51-54. Reprinted from *News-Casting* (U. S. Reduction Co., East Chicago, Ind.)

Results of nationwide questionnaire, survey, tabulated, illustrated, and discussed. (E11, Al)

290-E. Core Oil Evaluation Method. R. H. Olmsted. *American Foundryman,* v. 17, June 1950, p. 58-60.

Test data for 12 oils from 5 suppliers. Evaluation method developed as a result of analysis of the data. (E21)

291-E. The Core of Graphite Spherules in Nodular Cast Iron. A. L. De Sy. *Metal Progress,* v. 57, June 1950, p. 774-775.

Examination with the electron microscope proved existence of a definite, geometrically shaped core in the center of the graphite nodules. As a result it appears possible that crystallization of nodular iron is nucleated by a magnesium compound, and that the graphite spherulite results from the decomposition of a complex magnesium-silicon-carbide. (E25, CI)

292-E. Principles of Gating. William H. Johnson, William O. Baker, and William S. Pellini. *Foundry,* v. 78, July 1950, p. 70-74, 204-208.

See abstract of "Principles of Gating Design; Factors Influencing Molten Steel Flow From Finger Gating Systems", *American Foundryman,* item 148-E, 1950. (E22, CI)

293-E. Some Experiences in Producing Ductile Iron. Edward M. State and Bernard L. Stott. *Foundry,* v. 78, July 1950, p. 80-83.

Experiences of State Foundry & Machine Co., Cedar Grove, Wis. Mechanical properties equal to or better than those claimed were obtained. Typical nodular-iron castings. (E25, CI)

294-E. Matchplate Frames Facilitate Loose Pattern Work. *Foundry,* v. 78, July 1950, p. 172, 174.

New development designed to increase foundry output which involves use of interfitting matchplates. (E17)

295-E. Precision Die Casting Lowers End Product Cost. Ed Groeling. *Production Engineering & Management*, v. 25, June 1950, p. 58-61.

How lock fabrication is accelerated by die casting Zn alloy parts in clusters with dies incorporating precise multiple-master inserts. (E13, Zn)

296-E. Revolution in Casting. *Modern Industry*, v. 19, June 15, 1950, p. 38-43.

New research and production developments in ferrous sand casting. Programs of Gray Iron Founders' Society, Malleable Iron Founders' Society, and Steel Founders' Societies, of Battelle and Armour, and of numerous individual companies, are reviewed. (E11, CI)

297-E. Cast Iron Made Straight and Uniform by New Spinning Process. *Industrial Heating*, v. 17, June 1950, p. 1066.

New centrifugal casting process using sand-lined molds. (E14, CI)

298-E. Phenolic-Sand Foundry Molds. *Modern Plastics*, v. 27, July 1950, p. 79-80, 82-83, 86, 156, 158.

Process developed in Germany during World War II and first reported in the U. S. by William W. McCulloch in Office of Technical Services, U. S. Dept. of Commerce, Report No. 1168. Essentially the method consists of producing a comparatively thin shell-like metal-casting mold by applying a mixture of sand and a phenolic binder to a hot metal pattern and curing the layer of material. It is predicted that the process will become the largest single user of phenolics. (E19)

299-E. Nodular Cast Irons. J. E. Rehder. *Canadian Metals, v.* 13, May 1950, p. 16-18, 20, 46; June 1950, p. 16-18, 21, 46-47.

Foundry techniques for producing nodular iron. Chemical composition, structure and mechanical properties as related to production practice, and compared with gray and malleable iron. Applications. (E25, CI)

300-E. Moulding and Testing Non-Ferrous Hydraulic Castings. W. Thomson. *Foundry Trade Journal*, v. 88, June 1, 1950, p. 579-585.

Investigation of various types of test-bars and experiments with a "hydraulic" mixture. (E19, EG-a)

301-E. Gases and Steel. Andrew McCance. *Foundry Trade Journal*, v. 88, June 8, 1950, p. 615-622, 625.

Edward Williams lecture describes early work and present information concerning the effects of gases on the macro and microstructure and properties of steel. Methods for determination of gas content, sources of gas, and methods of removal. 17 ref. (E25, EG-m, CI)

302-E. Tung Oil Seals Porous Castings. George J. Dull. *Iron Age*, v. 165, June 29, 1950, p. 76-78.

A wide variety of castings are being impregnated with tung oil to seal leaks due to microshrinkage and microgas porosity. Results are so reliable that pressure testing is sometimes eliminated. Methods and costs. (E25)

303-E. Mechanized Casting Methods To Meet Today's Production Needs. *Production Engineering & Management*, v. 26, July 1950, p. 60-62.

Equipment and procedures of Belle City Malleable Iron Co., Racine, Wis. (E11, CI)

304-E. Investment Castings Depend on Good Pattern Tooling. Rawson L. Wood and Davidlee Von Ludwig. *American Machinist*, v. 94, July 10, 1950, p. 97-103.

Various aspects of pattern tooling and examples of good and bad practice. (E15)

305-E. Bibliography of the Permanent Mold Process. (Concluded.) Harold E. Bourassa. *Light Metal Age*, v. 8, June 1950, p. 17-20.

Permanent-mold process for the pouring of brass, bronze, aluminum bronze, yellow brass, manganese bronze, lead and zinc alloys, magnesium; slush casting in permanent molds; bearing alloys used in the permanent-mold process; vacuum permanent-mold casting process; centrifugal-casting and continuous casting in permanent molds; thermal conductivity in relation to the permanent-mold process; and refractory coatings for all types of permanent molds. (E12)

306-E. Light-Alloy Foundry and the Gas Problem. *Light Metals*, v. 13, June 1950, p. 326-331.

Chemistry, physics, and mechanics of hydrogen pick-up, methods of overcoming it as a danger, and of controlling it as an expedient. (E25, Al)

307-E. From a Metallurgist's Notebook: Impregnated Castings. H. H. Symonds. *Metal Industry*, v. 76, June 16, 1950, p. 474.

The use of resins to impregnate brass castings which show shrinkage porosity raises several problems. One of these is the effect of the plating cycle on the resin film. (E25, L17, Cu)

308-E. The "Lost Wax" Process of Precision Casting. J. S. Turnbull. *Institution of Mechanical Engineers, Proceedings*, v. 162, no. 1, 1950, p. 66-69; discussion, p. 70-74.

Previously abstracted from *Foundry Trade Journal*, item 84-E, 1950. (E15)

309-E. A Triple-Purpose Foundry; Mechanized, Semi-Mechanized and Jobbing. *Iron and Steel*, v. 23, June 1950, p. 289-294.

British ferrous foundry. (E general, CI)

310-E. Cast Crankshafts. (In Russian.) Ya. E. Gol'dshtein. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 10-15.

Production of low-alloy cast iron crankshafts having high mechanical properties. Stabilization of the structure and reduction of cast and structural stresses may be improved by high-temperature annealing for 2 hr. after mechanical working at 620° C. High mechanical properties of cast iron may be obtained either by reducing the total C and Si or by alloying with Mn (1.5 or 1.78%) and Ni (0.60 or 0.90%). (E25, J23, Q general, CI)

311-E. Machine Casting of Large Steel Sections. (In Russian.) A. V. Kiselev. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 59-61.

Equipment developed for mechanization of pouring and casting heavy cast-iron pieces weighing up to 15 tons each. (E11, CI)

312-E. Application of a Cupola With Several Rows of Tuyeres. (In Russian.) P. P. Berg and L. I. Serebrier. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 27-29.

Operation of cupola was experimentally investigated. Effects of various factors. Theoretical advantages of multiple-tuyere system. (E10, CI)

313-E. Die Cast Zinc on Wood. *Die Casting*, v. 8, July 1950, p. 25-26, 60.

Special technique for casting a bearing seat inside a wooden skate wheel. This produces a superior wheel with a high factor of safety. The method opens up new design possibilities for bonding die-cast metal to wood without scorching or damaging the wood. (E13, K11, Zn)

314-E. Steel Foundry Core and Molding Sands. John Howe Hall. *Foundry*, v. 78, July 1950, p. 75, 212-214.

Functions of cores, and properties and proportions of materials used in core-sand mixtures. (Fourth of series; to be continued.) (E18, CI)

315-E. Fundamentals of Feeding for Sound Tin Bronze Castings. Clyde L. Frear. *Foundry*, v. 78, July 1950, p. 76-79, 199-203.

Principles of riser design to insure adequate feeding. (Third of series; to be concluded.) (E22, Cu)

316-E. Producing Textile Machinery Castings. Pat Dwyer. *Foundry*, v. 78, July 1950, p. 84-87, 211-212.

History of the Whitin Machine Works, and its current practice in producing gray iron castings for textile machinery. (To be concluded.) (E11, T29, CI)

317-E. Basic Principles of Die Design; Ejector Mechanisms. H. K. Barton and L. C. Barton. *Machinery* (London), v. 76, June 29, 1950, p. 927-932.

Two-stage ejection for die casting machines; noncircular ejectors; sleeve ejectors; ring ejection; stripper plates; and oblique ejection. (E13)

318-E. Liquid Metal Properties; Effect on the Casting Fluidity of Alloys. V. Kondic. *Foundry Trade Journal*, v. 88, June 29, 1950, p. 691-695.

Data available which relate properties of a liquid alloy to results obtained in fluidity tests. Although different methods of fluidity measurement have been frequently used in the past, certain general and valuable relationships have been obtained, irrespective of the type of test. (E25)

319-E. Roll Founding. W. G. Scott. *West of Scotland Iron and Steel Institute, Journal*, v. 56, 1948-49, p. 1-21; discussion, p. 22-26.

In the roll industry, cast rolls are termed iron or steel according to the structural state of the total carbon. Each type is considered. Details of melting, casting, and molding practice and equipment. Metallurgical aspects are emphasized. (E11, T5, CI)

320-E. Centrifugal Casting in Engine Construction. (In German.) Herbert Lüttger. *Neue Giesserei*, v. 37 (new ser., v. 3), May 4, 1950, p. 165-167.

Brief general discussion includes remarks on the strength and structural properties of centrifugally cast cylinder linings. (E14, CI)

321-E. Problems of Metallurgical Research and Their Application to Foundry Practice. (In German.) W. Oelsen. *Neue Giesserei*, v. 37, (New ser., v. 3), May 18, 1950, p. 185-189.

Solubility of oxides in iron melts and the effect of metallurgical reactions on solubility; desulfurization by means of blast-furnace slags of different basicity and their use in the cupola; principles of dephosphorization reactions, and thermodynamic treatment of constitution diagrams. (E10, N12, CI)

322-E. Pressure Casting. (In German.) F. Jentzsch. *Metall*, v. 4, June 1950, p. 218-222.

Comprehensive discussion of the process, of suitable metals and alloys, and of pressure-casting machines and molds. Principles of designing pressure-cast parts. (E13)

323-E. Aluminum Alloys for Pressure Casting. (In German.) Ziegler. *Metall*, v. 4, June 1950, p. 223-225.

Two tables state the present and the proposed standards for composi-

tions, mechanical properties. Advantages of light-metal alloys and precautions for pressure casting. Photographs illustrate Al alloy pressure-cast parts. (E13, Al)

324-E. Magnesium Alloys as Materials for Precision Pressure-Cast Parts. (In German.) G. Lieby. *Metall,* v. 4, June 1950, p. 225-228.

A diagram illustrates the electrothermal production of Mg by reduction with carbon. Another diagram shows a pressure-casting arrangement. Comparative photographs show the superior appearance of pressure-cast Mg-Al parts over similar parts produced by other methods and from other metals. (E13, C23, Mg)

325-E. Zinc Pressure Casting. (In German.) H. Postel. *Metall,* v. 4, June 1950, p. 228-230.

Advantages of producing parts and articles by pressure casting. (E13, Zn)

326-E. Brass Pressure Casting. (In German.) G. Daase. *Metall,* v. 4, June 1950, p. 230-231.

Recommends the use of the alloy Tombasil which, because of its 4.5% Si content, is highly liquid in the molten state. (E13, Cu)

327-E. (Book) **Casting of Brass and Bronze.** Daniel R. Hull. 186 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.50.

Past and present equipment, as well as procedures and problems of melting, pouring, fabricating tin bronze, molding, and mold dressing. Use of oxygen, hydrogen, and deoxidizers. (E general, Cu)

F

PRIMARY MECHANICAL WORKING

139-F. Welding Speeds Production of Large Diameter Pipe. *Industry & Welding,* v. 23, July 1950, p. 30-32.

Production of 26-36-in. steel pipe by National Tube Co., McKeesport, Pa. Includes rolling and forming. (F26, CN)

140-F. New Extrusion Process Offers Product Improvement. *Production Engineering & Management,* v. 25, June 1950, p. 62.

Method developed for fabrication of ribbed sheeting of high strength and light weight for aircraft. (F24, T24, Al)

141-F. Pass Design of Angular Sections. Ross E. Beynon. *Iron and Steel Engineer,* v. 27, June 1950, p. 53-74.

Section rolling for a wide variety of shapes. (F23)

142-F. Electric Weld Tube Mill Goes Into Production at National Tube Co.'s McKeesport Works. *Iron and Steel Engineer,* v. 27, June 1950, p. 120-122.

Forming and welding equipment and procedures. (F26, CN)

143-F. Wire as an Engineering Material. N. Bruce Bagger. *Materials & Methods,* v. 31, June 1950, p. 75-82.

Basic characteristics of wire and the ways in which it can be worked and fabricated. Principal properties of the many different wire materials, and a number of typical applications to illustrate the versatility of wire as an engineering material. (F28, T general)

144-F. Overhead Radiant Heat Aids Axle Forging. Herbert Chase. *American Machinist,* v. 94, June 26, 1950, p. 73-76.

Conveyerized forging line at Ford's Canton plant which gets the furnaces up in the air to provide cooler working areas and a more compact layout. (F22, T21, ST)

145-F. Efficient Wrench Forging. Thomas A. Dickinson. *Steel Processing,* v. 36, June 1950, p. 285-287.

Two very different, yet related, forging techniques, by which a pair of California manufacturers produce hand tools, such as box and open-end wrenches. The first is Plomb Tool Co., where Erie board hammers are used; and the second is Thorsen Tools, where a pair of 100-ton punch presses are used in collaboration with an Acme forging machine and six automatic screw machines. (F22, G2, G17, T6, ST)

146-F. New Sheet for Fabricators. *Western Machinery and Steel World,* v. 41, June 1950, p. 81.

Radically different Al sheet for light metal fabricators announced by Reynolds Metals Co. embodies integral T-shaped stiffeners on one side. The sheet is produced by extrusion. (F24, Al)

147-F. Fundamentals of the Working of Metals. Part XII. Definitions of Terms Used in Processing and Fabricating of Metals. George Sachs. *Modern Industrial Press,* v. 12, June 1950, p. 6, 8.

(F general, G general)

148-F. American Wire Mill Equipment; A Review and Translation. Kenneth B. Lewis. *Wire and Wire Products,* v. 25, June 1950, p. 495, 532-533. From article by Heinz Hoehle, *Stahl und Eisen,* v. 70, Jan. 19, 1950, p. 41-51.

Mr. Hoehle visited some American mills in 1939 and again in 1949 and his observations are interesting in that they show clearly the progress of a decade. (F28)

149-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries,* v. 27, May 1950, p. 389-399, 402.

Contradictions and discrepancies between theory and practice. Experimental data from the literature are correlated and charted. (To be continued.) (F23)

150-F. Cold Drawing. III. L. Sanderson. *British Steelmaker,* v. 16, June 1950, p. 310-313.

Wiredrawing dies, problems involved in the reduction process, and practical advantages of cold drawn steel. Also galvanizing and patenting. (To be continued.) (F27, F28, J25, L16, ST)

151-F. New Gary Mill Processes Both Seamless and Welded Tubing. *Steel,* v. 127, July 3, 1950, p. 94, 97-98, 100.

New unit, included in National Tube's modernization program, features continuous rolling on a mandrel and incorporates the stretch-reducing process in 12 separately powered stands. The method is especially suited for making small-diameter tubing in long lengths at delivery speeds up to 1700 ft. per min. (F26)

152-F. Electric Welded Tube Mill Now in Production at McKeesport. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 779-782.

Includes plate bending and forming. (F26, CN)

153-F. Rolls and Rolling. Part XVI. Beams. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 792-803.

Roll-pass cross sections. (F23)

154-F. Cold Extrusion of Steel. Merle H. Davis. *Ordnance,* v. 35, July-Aug. 1950, p. 31-34.

Previously abstracted from *Finish,* item 99-F, 1950. (F24, ST)

155-F. Synchronized Drives and Controls Raise Fretz-Moon Operating Speeds. *Steel,* v. 127, July 10, 1950, p. 96, 98, 101-102.

Uniformly higher quality, greater pipe-size accuracy, and interior cleanliness of product produced on Wheeling Steel's new mill are attributed to both the synchronized all-electric motor drive for the integrated forming and welding stands and an adjustable "flying saw" mechanism. (F26, CN)

156-F. Rolling Aluminum at Davenport. *Light Metal Age,* v. 8, June 1950, p. 6-9, 22-24.

Alcoa's aluminum rolling mill at Davenport, Iowa. The mill itself contains more than 6¼ million lb. of Al. (F23, T26, Al)

157-F. Contribution to the Study of Rolling Pressure. (In French.) J. Stremsdoerfer. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 237-259.

A theoretical study for the case of a rectangular bar rolled between smooth cylinders. New formulas are proposed for calculation of pressure and rolling force. Results (using the above formula) are compared with those determined using Ekelund's formulas. (F23)

158-F. Rolled Magnesium-Zirconium Alloys. (In German.) Franz Sauerwald. *Zeitschrift für Metallkunde,* v. 41, Mar. 1950, p. 81-87.

Magnesium alloys, whose cast grain size has been reduced by refining with zirconium, have especially good plastic properties and are well suited for rolling, especially rolling directly as-cast without preliminary extrusion. Binary and polynary alloys have good corrosion resistance and mechanical properties. (F23, Q general, R general, Mg)

159-F. Rapid Heating of Billets in Gas-Fired Furnaces. (In Russian.) V. F. Kopytov and P. V. Sorokin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 54-58.

Furnace design and time of heating of round and square billets and sheets of medium-carbon steel up to 60 mm. thick and also pipe of low-carbon steel of up to 5-mm. wall thickness. (F21, CN)

160-F. Propagation of the Plastic-Deformation Front in Bars During Rolling in a Blooming Mill. (In Russian.) T. M. Golubev. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 401-406.

Depth of penetration of plastic deformation on compression in bars of large cross section, depending on compressive force, rate of rolling, and diameter of rollers. Formulas for determining optimum roller diameter. (F23, Q24)

161-F. New French Steel Plants—Details of Mills and Drives. Glenn E. Stolz. *Iron Age,* v. 166, July 13, 1950, p. 96-97.

Emphasis on blooming, hot-strip, and other rolling mills—also pickling facilities. (F23, L12, ST)

162-F. Aluminum Wire—Its Fabrication and Uses. C. J. Beneke. *Wire and Wire Products,* v. 25, July 1950, p. 571-573.

Alloy selection and fabrication, dies, lubricants, methods and equipment, annealing and solution heat treating, straightening, and uses. Typical mechanical properties are tabulated. (F28, Al)

163-F. Carbide Wire Drawing Dies—Bearings Vs. No Bearings. J. O. Tompkins. *Wire and Wire Products,* v. 25, July 1950, p. 576-578.

Results of research on drawing tire-bead wire in carbide dies with and without "bearings". Bearings

were found to produce superior results. (F28, ST)

164-F. Application and Use of Lubricant Coatings. Floyd M. Hauger. *Wire and Wire Products,* v. 25, July 1950, p. 579-581, 610.

New coating compound that eliminates both the use of lime and lubricants in the die box in ferrous wire drawing. Composition is not given. (F28, Fe)

165-F. The Manufacture of Coaxial Cable. W. E. Hammersla. *Wire and Wire Products,* v. 25, July 1950, p. 582-583, 598, 600, 602-603.

Process includes drawing of copper rod and tape and wrapping stainless-steel tape around a copper tube. (F28, T1, SS, Cu)

166-F. Cross Roll Straightening Machine. *Product Engineering,* v. 21, July 1950, p. 96-97.

Machine removes bends and kinks from 2-in. bars and tubes at the rate of 7,000 20-ft. pieces per 8-hr. day. Since rolls do the straightening, power consumption is about 50% less than for machines having rigid guides. (F29)

167-F. McLouth: Unconventional Strip Supplier. *Steel,* v. 127, July 17, 1950, p. 62-63.

Trenton plant takes an ingot from the soaking pits, runs it through a bloomer down to 5/8 in., then a reversing mill without reheating to squeeze it to automotive gages. (F23, CN)

168-F. U. S. Sets Up Proving Ground for Forging Techniques. *SAE Journal,* v. 58, July 1950, p. 61-62. Based on "Military Significance of Large Pressure Forgings", by K. B. Wolfe.

Equipment of government-equipped and industry-operated facility for developing forging techniques being set up at Adrian, Mich., with the backing of the U. S. Air Force. The forging will be done in heavy vertical hydraulic forging presses obtained from Germany. (F22)

169-F. Cold Rolling Technique; The Application of Theory and Experiment to the Practice of Rolling. Methods of Calculating Roll Force and Torque Based on Theories of Rolling. 6. (Series continued.) Hugh Ford. *Sheet Metal Industries,* v. 27, June 1950, p. 485-491.

Detailed calculations for a number of examples using Siebel's method. Also Ekelund's method, and tabular comparison of experimental and calculated values of roll force, using Ekelund's formula. (To be continued.) (F23)

170-F. National Tube Starts Operation of New Mills at Gary. *Iron and Steel Engineer,* v. 27, July 1950, p. 123-126, 128.

New equipment for forming, drawing, welding, pickling, and finishing. Stainless and other steel tubing is produced. (F26, ST, SS)

171-F. (Book) **The Rolling of Metals. Vol. I.** L. R. Underwood. 344 pages. Chapman & Hall, Ltd., 37 Essex St., London W.C.2, England. £2, 2s.

Mainly concerned with the forces involved in the rolling of relatively thin sheet and strip. The only important omission appears to be any mention of methods of measuring forces and other variables involved. There is a great deal of useful comparison between experiment and theory. (From review in *Metal Industry.*) (F23)

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G

SECONDARY MECHANICAL WORKING

193-G. Contour Machining Reproduces Forgings and Castings. H. J. Chamberland. *Iron Age,* v. 165, June 22, 1950, p. 90-92.

How tooling costs for short-run production can be eliminated by making parts with contour saws. Three-dimensional cutting is being done. Such parts are said to be sometimes stronger than those produced by regular methods. (G17)

194-G. Friction Cutting of Steel. John E. Hyler. *Steel Processing,* v. 36, June 1950, p. 295, 310.

Circular and bandsaw processes; present and potential applications. Special work-tilting technique which makes the bandsaw process applicable to heavier pieces of flat stock than otherwise. (G17, ST)

195-G. Deep and Tapered Stampings Without Wrinkles. R. Burt Schulze. *Metal Progress,* v. 57, June 1950, p. 769-772.

Marform process works well for bending, simple stretching, or a combination of the two. However, wrinkles are likely if the metal must be shrunk—a disadvantage corrected by confining the rubber pads on all sides with fairly high pressure varied correctly during the entire forming stroke. (G1)

196-G. Machining of Stainless Steel. E. Von Hambach. *Metal Progress,* v. 57, June 1950, p. 781-791.

Specific information and recommendations concerning tool angles, speeds, feeds, and coolants for the principal types of stainless steels and the principal machine-shop operations. (G17, SS)

197-G. Stretch-Forming. *Aircraft Production,* v. 12, June 1950, p. 184-189.

New-type machine developed and installed at Fairey Aviation Co. Ltd., in Britain. (G9)

198-G. Newer and Higher Press Precision Standards Set in Manufacture of Chevrolet Automatic Transmission. P. D. Aird. *Modern Industrial Press,* v. 12, June 1950, p. 13-14, 16, 42, 44.

Press operations, annealing, and welding. (G1, J23, K general, T21, ST)

199-G. KoolVent Aluminum Awnings Are Custom-Made in Small, Efficient Plants. Walter Rudolph. *Modern Industrial Press,* v. 12, June 1950, p. 34, 36, 38.

Forming, shearing punching, trimming, and finishing operations. (G1, Al)

200-G. Milling Machine Power Requirements. A. O. Schmidt. *Western Machinery and Steel World,* v. 41, June 1950, p. 65-67.

Experiments on factors influencing power consumption and cutter wear demonstrated in milling of steel and other common metals and alloys using tungsten-titanium carbide cutters. (G17)

201-G. Cutting Tips. D. S. Jones. *Western Machinery and Steel World,* v. 41, June 1950, p. 68-69, 87.

Practical hints for flame cutting and maintenance of equipment. (G22)

202-G. Shade Screen From Sheet. *Western Machinery and Steel World,* v. 41, June 1950, p. 76-77.

Complex cutting and forming machine designed by Kaiser Aluminum and Chemical Corp. for manufacture of a new type of window screen by perforating and forming Al sheet. (G15, T10, Al)

203-G. Nail Production. Geoffrey K. Rylands. *Wire and Wire Products,* v. 25, June 1950, p. 487-491, 524-530.

Equipment and procedures of Rylands Brothers, Ltd., England. Besides production of nails from wire using special machines, considerable emphasis is placed on barrel polishing and galvanizing operations. (G10, L10, L16, T7, CN)

204-G. The Business of Cold Heading. Kenneth J. Sorace. *Wire and Wire Products,* v. 25, June 1950, p. 500-501, 517-518.

Some experiences in production of miscellaneous steel screws and bolts by Lamson & Sessions Co., Cleveland. (G10, ST)

205-G. Tests Prove Worth of Cold Extruded Bolts. A. S. Jameson, J. A. Halgren, and S. A. Sheridan. *Iron Age,* v. 165, June 22, 1950, p. 81-84; June 29, 1950, p. 72-75.

Cold headed, double-extruded, hexagon-head steel bolts are more economical to manufacture than the quenched and tempered variety. Method of manufacture, mechanics of cold working, and effect of reheating on the microstructure and physical properties. Part 2: Mechanical-test results. (G5, G10, Q general, T7, CN)

206-G. The Drawing of Stainless Steels. R. H. Henke. *Tool & Die Journal,* v. 16, June 1950, p. 48-49, 62, 70; July 1950, p. 40-42, 44.

Factors affecting drawing. Composition and its effect on annealed tensile properties. Compares plastic deformation with that of nonferrous materials. (G4, Q24, SS)

207-G. Charts Simplify Cost Calculations. Part 4. Milling Feed and Time. Tyler G. Hicks. *Machine Design,* v. 22, July 1950, p. 151-152.

Milling-machine feed and the subsequent milling time required for a specific operation. Curves cover six common metals and alloys. (G17)

208-G. Carbides Speed Machining of Chilled Iron Rolls. Joseph Frisch. *Iron Age,* v. 166, July 6, 1950, p. 94-96.

Advantages on the basis of Allis-Chalmers experiences. (G17, T5, C, CI)

209-G. British Cutting Torch Said To Save Gases. *Welding Engineer,* v. 35, July 1950, p. 30-31.

Torch built on an entirely new

principle of design has been used with satisfactory results in a British steel foundry for well over a year to cut off headers and risers. Large savings in gas consumption (12-40%) are claimed. (G22, CI)

210-G. Precision Manufacture of Aluminum. Gilbert C. Close. *Light Metal Age,* v. 8, June 1950, p. 10-11, 20-21.

Casting, machining, seamless-tube extrusion, brazing, finishing, etc., as applied to manufacture of Al aircraft accessories at AiResearch Mfg. Co., Los Angeles. Machined tolerances within 0.0001-in., dynamic-balance tolerances equivalent to 5-millionths of an inch, and over all precision tolerances 30 times finer than used in the best watches, are routine production-line requirements. (G17, T24, Al)

211-G. New Process for Manufacturing Aluminum Foil Tubes. *Light Metal Age,* v. 8, June 1950, p. 12-13.

New equipment and process produces tubes from foil, laminated or coated on both sides with plastic. Precoated, preprinted foil is formed into cylinders and heat sealed. Then the neck and threads are formed. (G general, T10, Al)

212-G. Stampability Test for Medium and Heavy Sheets. (In French.) Eug. Herzog. *Revue de Métallurgie,* v. 47, May 1950, p. 399-408.

A modification of G. Sachs' test for determination of stampability. Deformation taking place during the test is thoroughly analyzed. Operating technique. Application of the test to steel sheets. (G3, Q23)

213-G. Oxy-Kinetic Cutting. (In French.) A. E. Leduc. *Revue de la Soudure; Lastijdschrift,* v. 6, no. 1, 1950, p. 31-41.

See abstract of condensed English version in *Engineers' Digest,* item 150-G, 1950. (G22, ST)

214-G. Determination of Optimum Lead Angle of Hard-Alloy Cutting Tools During Rapid Cutting. (In Russian.) M. N. Larin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 41-49.

Simplified relationship, based on experimental data. Influences of yield strength, bend resistance, rate of cutting, and thickness of cut. Optimum cutting conditions are tabulated for 37 special steels. (G17, ST)

215-G. Cold Stamping of Complex Dies for Punch Presses on Hydraulic Presses. (In Russian.) A. I. Kogan. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 49-54.

Practical development of a method of forming punch-press dies by cold stamping. Such a method, using hydraulic presses, guarantees a shape accuracy within 0.03 mm. and a surface finish accurate to 1 μ. Three basic types of such stampings were studied in detail. Optimum conditions were determined for different materials and die dimensions. (G3, T5, ST)

216-G. Investigation of Operation of Lathes Using Cutting Tools With Diamond Tips. (In Russian.) A. G. Nalchan. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 6-9.

Factors causing vibration of lathes and influence of the latter on the uniformity and precision of the finished surface during machining of an Al-Mg alloy piston. Means of reducing harmful vibration. (G17, Al)

217-G. Surface Quality During Planing of Metals. (In Russian.) P. E. D'yachenko and A. P. Dobychina. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 12-14.

Influence of various factors, such as sharpness of the cutting edge, thickness of metal, rate of planing, cutting speed and structure of base metal (sorbite, grainy pearlite, plastic pearlite, and as-received normalized steel structures) on surface quality. (G17, ST)

218-G. Oxygen and Arc Cutting of Scrap Metal (Intended for the Openhearth Furnace.) (In Russian.) S. V. Begun. *Avtogennoe Delo (Welding),* v. 21, Mar. 1950, p. 23-24.

Optimum methods of cutting up different types of scrap metal for the openhearth charge were studied, comparing oxygen and electric-arc cutting. (G22, ST)

219-G. Determining the Machinability of Metals. Gerald Lewis. *Machinery* (American), v. 56, July 1950, p. 152-154.

Machinability tester suited for use by workers of average skill. This instrument, known as the MSE-Schlesinger machinability tester, rapidly measures the two basic characteristics of machinability. These are specific cutting resistance and abrasive effect. (G17)

220-G. Production, A Series of Compromises. Louis J. Lovisek. *Wire and Wire Products,* v. 25, July 1950, p. 563-567.

Compromises in the making of screws by cold heading and thread rolling, necessitated because of cost factors. Compromises also extend to quality standards on the rods used as raw material. Considers only ferrous materials. (G10, G12, S22, Fe)

221-G. What Carbide Insert Tools Can Do for You. *Steel,* v. 127, July 17, 1950, p. 80-81, 96.

How carbide inserts can reduce machining costs by speeding production, and by cutting down time needed for changing setup, regrinding, and resharpening. (G17, T6, C)

222-G. Coin-Dimpling; Counter-Pressure Process for the Accurate Control of Rivet-Head Form. Part I. Basic Principle and Governing Factors. *Aircraft Production,* v. 12, June 1950, p. 181-183.

Method of pre-forming the harder light alloys for flush-riveting without causing cracks, originally developed for use on 24S-T sheet in the shops of North American Aviation, Inglewood, Calif. (To be continued.) (G2, Al)

223-G. Free-Cutting Steel Machinability Measured by New 'Yardstick'. *Screw Machine Engineering,* v. 11, July 1950, p. 36-38.

New method based on the use of a Monarch lathe equipped to provide fixed tool pressures with a constant component in horizontal direction. Developed by Monarch Machine Tool Co., in cooperation with Battelle Memorial Institute under the sponsorship of Carnegie-Illinois Steel Corp. (G17)

224-G. "Oxyarc" Oxygen-Electric Arc Cutting. (In German.) H. Schmidt-Bach. *Schweissen und Schneiden,* v. 2, May 1950, p. 93-96.

New process, its use in the cutting of different metals, for removal of rivets, and for hole cutting. (G22)

H

POWDER METALLURGY

50-H. Precision Stainless Parts by Powder Metallurgy. A. J. Langhammer and Phillip Glick. *Iron Age,* v. 165, June 22, 1950, p. 93-94.

Manufacture of some stainless-steel precision parts through powder metallurgy is said to save some 75% of production cost over standard machining methods. Good stainless powder is key to successful fabrication of machine parts, filters, and bearings. Various examples. (H general, T7, SS)

51-H. The Densification of Pre-Reduced Copper Powder Compacts in Vacuum and in Hydrogen. Charles B. Jordan and Pol Duwez. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 943-944.

A study of the increase in density of copper powder compacts as a function of the time and temperature of sintering has been previously reported. The present note describes results of a series of experiments under similar conditions except that the Cu powder was reduced for several hours in hydrogen at 500 or 600° F. before pressing. (H15, Cu)

52-H. Remarks on Mizushima's Method for the Determination of Surface Area of Powders. Ying Fu. *Journal of Chemical Physics,* v. 18, June 1950, p. 899-900.

Shows incorrectness of Mizushima's equations. (H11)

53-H. The Effect of Foreign Gases on the Grain Boundaries of Copper Powder During and After Sintering. (In German.) Horst Schreiner. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 113-121.

The amount of methanol vapor absorbed by electrolytic copper powder sintered in vacuum or in a hydrogen or nitrogen atmosphere was determined. Effects on the sintering process. (H15, Cu)

54-H. Contribution to the Theory of the Powder-Metallurgical Saturation Process. (In German.) Paul Schwartzkopf. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 218-222.

Process is explained and schematically illustrated. Structure of a piece of spongy sintered Fe saturated with Cu. (H16)

55-H. Hardness Measurements on Metallic Sintered Bodies. (In German.) Karl Adlassnig. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 248-257.

Hardnesses of copper bodies sintered for various temperatures and times were determined by the Vickers, Brinell, Rockwell, and scleroscope methods and the results compared with each other as well as with their other properties. Effects of structure on properties. 10 ref. (H15, Q29, Cu)

56-H. Production of Fine Metal Powders by Hydrogen Reduction. (In Czech.) Miroslav Petrdlik. *Hutnické Listy,* v. 5, Mar. 1950, p. 105-111.

Conditions for complete reduction by hydrogen of the oxides of W, Mo, Fe, Ni, Co, Cu and Pb. By this method finely-grained metal powders are obtained. The reduction is carried out in an electric tube furnace with two temperature zones. The material being reduced flows continuously through the furnace in the opposite direction to the hydrogen. Also presents a method of calculating water-vapor concentration in the reducing atmosphere from conditions in the furnace, and a calculation of composition of the reduction products of various degrees of oxidation based on oxidation number. (H10, Mo, Fe, Ni, Co, Cu, Pb, W)

57-H. Pressing and Sintering of Metallic and Nonmetallic Powders. (In Polish.) W. Rutkowski and H. Rut-

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kowska. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 111-125.

Fe, Cu, Fe-Cu, Cu-Mn, Fe-Mn, and Fe-Cu-Mn powders of electrolytic origin were pressed and sintered. Grain size and grain-size distribution, apparent and true density. Behavior on mixing and compacting with other metallic or nonmetallic powders. 14 ref.
(H14, H15, Fe, Cu, Mn)

58-H. Sintered Porous Graphite-Bronze Bearings. (In Polish.) A. Krupkowski, and W. Cegielski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 163-179.

A method of making porous bearings by sintering metallic powders. Preparation and mixing of powders, pressing and heat treating, oil impregnation, machining, and assembly of sintered bushings. Tests show how various physical and mechanical properties of graphite bronzes depend upon production factors and graphite and tin content. 15 ref. (H general, P general, Q general, T7, Cu)

59-H. Powder Metallurgy; A Mid-Century Review and Preview. Paul Schwarzkopf. *Mechanical Engineering,* v. 72, July 1950, p. 543-548.

Application in high-melting refractory metals; development of cemented carbides; theoretical considerations; the practical approach; intermetallic compounds; development of ferrite materials; manufacturing composite contact materials by infiltration; powder metallurgy in competition with other processes; and mechanism of infiltration process. (H general)

60-H. Ceramics—Silicon Ceramics—Metal Ceramics. (In German.) Max Hauser. *Sprechsaal für Keramik; Glas; Email,* v. 83, Feb. 5, 1950, p. 41-47.

The physicochemical differences between clays, silicon, and other metals as ceramic materials. Shows that the expansion coefficient, thermal conductivity, and corrosion resistance of silicon makes it, for certain purposes, an especially desirable ceramic material. Powder metallurgy is considered a ceramic process and the possibility of using mixtures of clays with powdered metals or ores is discussed. 18 ref. (H general, Si)

61-H. Determining the Compacting Behavior of Iron Powders by Means of a Bending Test. (In German.) Hans Bernstorff and Friedel Moser. *Stahl und Eisen,* v. 70, May 11, 1950, p. 416-420.

Effect of preliminary annealing and processing of iron powders on their pressing and sintering properties, effect of graphite in Fe-graphite mixtures, and behavior of Fe powders produced by different methods. The bending test was found to be sensitive to any variations in materials or methods of sintering. (H14, H15, Fe)

62-H. (Book) **Metallkeramik** (Production of Metal Bodies From Metal Powders, Science and Technique of Sintered Metals, and Metal Powders), Ed. 4. Franz Skaupy. Verlag Chemie, Weinheim-Bergstrasse, Germany. 19 DM.

Exhaustive introduction and two main parts—general and special. First part: Techniques of preparation of metal powders, methods for their investigation and special properties. Methods of cold and hot pressing and subsequent sintering. Internal processes and reactions between powder particles. Second part: The highly refractory pure metals, their carbides and similar compounds; role of the binder; manifold uses of hard metals. Includes the new metal-ceramic compounds and a patent register.
(H general, EG-d)

J

HEAT TREATMENT

143-J. Localized Heating. Paul A. Furkert. *Industrial Gas,* v. 28, June 1950, p. 6-7, 23-26.

Various ways in which localized gas heating is or might be used in heat treating, heating for forging, or soldering and brazing. Shows how salt baths can be eliminated in many cases. (J general, K7, K8)

144-J. Reduced Operating Costs Highlight Operation at Taylor-Wharton Iron and Steel Co. S. M. Stoler. *Instrumentation,* v. 4, 2nd qtr. 1950, p. 12-13.

Design and operation of normalizing furnace and controls.
(J24, S16, ST)

145-J. How To Determine Case Hardenability. Richard F. Harvey. *Steel,* v. 126, June 26, 1950, p. 80-82, 84.

Use of microhardness tests. Procedure also can be applied to measurement of decarburization depth of cyanided and nitrided cases as well as to surfaces hardened selectively by induction or flame-hardening techniques. (J28, ST)

146-J. Modern Heat Treating. III. Interrupted Quenching. William Adam Jr. and Leon B. Rosseau. *Metal Progress,* v. 57, June 1950, p. 765-768.

Several items of heat treating lore are shown to be false upon scientific investigation. One is that the faster the quench the harder the steel—whereas carbon content is the ruling factor. Another is that a cold quenching bath is necessary for adequate hardening, yet agitated molten salt has high cooling power. A third is that annealing requires very long times and slow coolings, yet cyclic annealing violates both rules. How modern salt baths and furnaces fit these findings. (J26, J2, ST)

147-J. Quality Heat Treating Builds Small Shop. John C. McComb. *Steel Processnig,* v. 36, June 1950, p. 297-301.

Equipment and procedures of Walker Heat Treating Co., Cleveland. This shop specializes in the treating of toolsteels, die-casting dies, plastic-forming dies, and similar work. (J general, TS)

148-J. Heat Treatment of High Pressure Cylinders. S. M. Stoler. *Steel Processing,* v. 36, June 1950, p. 302-303, 317.

Continuous heat treatment of cylinders at Taylor-Wharton Iron and Steel Co., using new high thermal head heating methods. Advantages. (J1, T26, ST)

149-J. Thin Metal Parts Successfully Heated by Induction. Joseph F. Libsch and Anthony Vescuso. *Wire and Wire Products,* v. 25, June 1950, p. 498-499, 519-521.

Advantages of induction heating for small wires and metal parts lie primarily in its ability to avoid distortion of the work. Describes technique using a standard commercial converter operating at 500 kc. or less, suitable for heat treatment of both small and large sections. (J2)

150-J. Controlled Cooling of Steel Blooms in Car Bottom Furnaces. Charles J. F. Burch. *Iron and Steel Engineer,* v. 27, June 1950, p. 86-94; discussion, p. 94.

Proposed method for transferring blooms into car-bottom furnaces for controlled cooling after rolling. Blooms can be charged into furnace before temperature of any bloom falls below 600° F. (J21, ST)

151-J. Heat Treating Bolts Quickly and Efficiently at Oldsmobile. *Industrial Heating,* v. 17, June 1950, p. 964-966, 968, 970.

Line consists of hardening furnace, oil quench, cleaning machine, and draw-furnace. (J26, T7, ST)

152-J. Heat Treatment of Alloy Steels. II. (Concluded.) C. E. McDermott. *Industrial Heating,* v. 17, June 1950, p. 980, 982, 984, 986.

Definitions and explanations of quenching factors, tempering, austempering, and martempering. Some advantages and limitations of these processes. (J26, AY)

153-J. New Furnaces Heat Copper Billets and Anneal Strip Continuously. *Industrial Heating,* v. 17, June 1950, p. 998, 1000.

Continuous billet heater and continuous roller-hearth, bright-annealing furnace at California plant of Revere Copper & Brass, Inc.
(J23, Cu)

154-J. Western Metal Processing Methods Stepped Up by Gas Equipment Improvements. Ralph W. Marshall. *Western Metals,* v. 8, June 1950, p. 26-29.

Various procedures and equipment in which gas is used as fuel. Includes heat treating, joining, forging, melting, heating of pickling and other solutions, etc. (J general, B18)

155-J. Induction Heating. *Canadian Metals,* v. 13, June 1950, p. 12.

Briefly describes process. (J2)

156-J. Carburizing With Prepared Town's Gas. L. G. W. Palethorpe. *Machinery* (London), v. 76, June 8, 1950, p. 815-820.

Preparation of the gas, equipment for carburizing, and recommended carburizing procedures. (J28, ST)

157-J. Heat Treatment of High Speed Steel Tools; The Use of Efco-Ajax-Holtgren and Efco-Sentry Equipment. R. C. Stockton. *Machinery* (London), v. 76, June 1, 1950, p. 778-782.

The Efco-Ajax-Hultgren equipment utilizes salt baths in three stages of treatment. The Efco-Sentry equipment utilizes a carbon muffle which is replaced when worn away by slow burning at the hardening temperature in the presence of a limited amount of air. It is suitable primarily for small-quantity work. (J26, J2, TS)

158-J. Annealing Aluminum Sheet. *Linde Tips,* and *Oxy-Acetylene Tips,* v. 29, July 1950, p. 62-63.

Simple procedure using the oxy-acetylene flame only. It can be applied to those Al alloys which are work hardened by rolling, such as 2S, 3S, and 52S. (J23, J2, Al)

159-J. Isothermal Annealing Improves Forging Machinability. A. H. Allen. *Steel,* v. 127, July 10, 1950, p. 84-85.

By salt-bath annealing alloy-steel ring gears and other automobile parts after press forming, Ford eliminates snot cleaning, lengthens cutter life up to 75%, and cuts need for relapping. (J23, T21, AY)

160-J. Production Case Hardener. W. L. Corteggiano. *Machine Design,* v. 22, July 1950, p. 125-127.

Westinghouse development, the horizontal rotating scanner with automatic work loader, designed to selectively case harden miscellaneous cylindrical parts. (J28, ST)

161-J. Quenching; Some Aspects of the Rate of Cooling in Various Media. *Iron and Steel,* v. 23, June 1950, p. 303-306.

Mechanism of the process; effects produced on the bodies quenched; cooling media. Cooling curves for the center of various shapes and sizes. (J26, J2)

162-J. Application of Sawdust During Carburization. (In Russian.) V. P. Gerassimov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 26.

Proposes use of sawdust, heated previously to 500° C., instead of charcoal for carburization. (J28, ST)

163-J. The Hardening Operation in the Practical Heat Treatment of Steel. Quintin C. McMillan. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 98-119; discussion, p. 120-125.

Commercial equipment and procedures, as well as their fundamental metallurgical basis. Hardenability testing and effects of different heat treatment schedules on hardness and impact strength of unalloyed and low-alloy steels. (J26, ST)

164-J. Research on the Soft Annealing of Unalloyed and Low-Alloy Steels. (In German.) Sepp Ammarellen. *Stahl und Eisen,* v. 70, May 25, 1950, p. 459-463.

Methods for soft annealing structural and toolsteels. Rate of spheroidization of cementite in steels containing 0.65-1.35% C and effect of temperature on the cementite were studied. (J23, N8, CN, TS)

165-J. The Hardening Behavior of the Refined Steels. (In German.) Ernst Kunze. *Stahl und Eisen,* v. 70, May 25, 1950, p. 475-476.

Critically reviews a German book by J. Kubasta which proposes a "transformation index" as a method of indicating the hardenability of a given steel and a formula for computing hardness depth. (J26, ST)

166-J. (Book) **High-Frequency Induction Heating, Ed. 2.** Frank W. Curtis. 389 pages. 1950. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $6.00.

Explains fundamental electrical principles involved. Many applications to specific heating problems—for hardening metal parts, joining of metal assemblies, etc. Types of steel best suited to induction hardening and various means of quenching. A comprehensive analysis of coil design and new material on fixture designs are included in this new edition. Material has been amplified on brazing alloys and fluxes, on localized hardening, and on joining of metal assemblies. (J2)

K

JOINING

356-K. Metlbonding Saves Time, Money on B-36. *Aviation Week,* v. 52, June 19, 1950, p. 20-22, 25-26.

New Convair adhesive development which speeds production of superbomber's skin assemblies. (K12, T24)

357-K. "Stored Energy" Welds Dissimilar Metals. A. H. Allen. *Steel,* v. 126, June 26, 1950, p. 72-73.

New gun technique and apparatus by which studs up to ½ in. diameter are joined to base metals of a wide variety of types and thicknesses. Readily adapted to mass production processes, the technique requires no special metal preparation or fluxes. (K1)

358-K. Multi-Arc Welding of Thin Sheet. *Metal Progress,* v. 57, June 1950, p. 808, 810, 814, 816. Translated and condensed from "Multiarc Welding", K. V. Zvegintseva.

Previously abstracted from *Avtogennoe Delo.* See item 22B-447, 1949.

359-K. Brazing and Soldering of Metals Accomplished by Induction Heating Methods. *Materials & Methods,* v. 31, June 1950, p. 63-66.

Typical setups for medium and small-lot production. Tables give compositions and melting points of various Sn-Pb soft solders and of silver brazing alloys. (K7, K8, Sn, Pb, Ag)

360-K. Efficient Flux Recovery Saves Money. *Industry & Welding,* v. 23, July 1950, p. 20-21, 65.

Describes and illustrates various flux-recovery installations. In both manual and automatic hidden-arc welding, the arc is hidden under a mound of granular inorganic flux, only one-third of which is used in the particular weld. (K1, A8)

361-K. Kodak and Welding. Henry H. Brown. *Industry & Welding,* v. 23, July 1950, p. 22-23, 26, 64.

Varied applications of welding at Eastman Kodak Co., mainly in the fabrication of tanks, reaction vessels, and other equipment. (K general, T29)

362-K. Argon Vs. Helium in Inert Atmosphere Arc Welding. Paul Paquin. *Industry & Welding,* v. 23, July 1950, p. 24, 50-51.

Pros and cons of the two gases. (K1)

363-K. Silver Brazing With Induction Heat at Oneida, Ltd. Stewart M. Hill and Richard A. Gehr. *Industrial Heating,* v. 17, June 1950, p. 972-974, 976.

Equipment and procedures for joining stainless steel knife blades to hollow handles. (K8, SS)

364-K. New Welding Techniques Improve Product Quality and Lower Cost. Hugo W. Hiemke. *Western Metals,* v. 8, June 1950, p. 33-34.

Various new techniques and their applications. (K general)

365-K. Arc Welding in Machine Construction. R. G. Alison. *Canadian Metals,* v. 13, June 1950, p. 32-34, 37.

Advantages, applications, and costs, as applied to mild and low-alloy steels. (K1, ST)

366-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Seferian. *Sheet Metal Industries,* v. 27, May 1950, p. 435-444.

Investigation of weld structures; practical application of thermal analysis; the fusion zone; the parent metal; structural changes in the parent metal; physical and chemical changes; qualitative definition of weldability; and determination of weldability. Concerned only with steels. 50 ref. (To be continued.) (K9, ST)

367-K. Automatic Welding of Aircraft Storage Containers by the Submerged-Arc Process. A. I. Nussbaum. *Sheet Metal Industries,* v. 27, June 1950, p. 533-535.

Procedures at Goodyear Aircraft Corp., Akron, Ohio. Sheet steel is used. (K1, CN)

368-K. The Use of Welding in the Construction of Public Cleansing Vehicles. *Sheet Metal Industries,* v. 27, June 1950, p. 540-542.

As applied to dump trucks by British firm. (K general, T21, CN)

369-K. Brazing and Welding Coated Materials. E. V. Beatson. *Welding,* v. 18, June 1950, p. 232-242.

Techniques for brazing various types of metal-coated materials: also resistance welding methods. 11 ref. (K8, K3)

370-K. The Inspector's Approach to Arc Welding. C. W. Ephithite. *Welding,* v. 18, June 1950, p. 255-260.

Fillet welds, deep-penetration welds, square-butt welds, and automatic welding. Common defects and points to be watched. (K1, S general)

371-K. Welding Drawn Shells to Aluminum Diecastings. *Iron Age,* v. 165, June 29, 1950, p. 82.

Spot welding procedure used in fastening the drawn 3S Al spinner shell to the spinner bottom of die-cast 307 Al alloy, in assembly of portable washing machines. (K3, Al)

372-K. Stud Welding Tannery Comb Teeth. *Iron Age,* v. 165, June 29, 1950, p. 82.

Special setup for economical production of a new hair combing and drying machine for tannery use. 30,000 pins on 36 rolls carry hair in a continuous thin layer through each machine. (K1, CN)

373-K. Sealing Solder. G. S. Phipps. *Bell Laboratories Record,* v. 28, July 1950, p. 295-297.

New technique used for sealing cracks in wiped joints in lead cable. A supplementary layer of a lower melting solder (52.5% Bi, 32% Pb, and 15.5% Sn) fills the cracks in the wiping solder (34.5% Sn, 1.25% Sb, 0.11% As, balance Pb), forming a good seal. Crack structure and probable sealing action of solder. (K7, Pb, Bi, SG-f)

374-K. Weld Without Flash. Charles Bruno and G. W. Birdsall. *Steel,* v. 127, July 10, 1950, p. 86-87, 102.

Advanced flash-welding technique opens applications for aluminum previously considered impractical or economically impossible because of high fabrication costs. Equipment of improved design reduces the weld-zone, width to 0.006-0.010 in. hence practically eliminating flash and the problem of removing it. (K3, Al)

375-K. Stress-Relieved Brazing Rings Cut Assembly Costs. John Evans. *American Machinist,* v. 94, July 10, 1950, p. 109.

Nondistorting silver solder preforms and use of induction heating reduce rejects, show enormous increases in production over manual brazing in production of strainer assemblies for household refrigerators. (K8, T10)

376-K. Arc Welds Can Be Enameled Successfully. A. N. Kugler. *Ceramic Industry,* v. 55, July 1950, p. 65, 67.

Use of low-hydrogen electrodes for arc welding gives reasonable assurance that delayed flaking and blistering of enamel will not occur. Results of comparative experiments with various types. (K1, L27, CN)

377-K. Stresses in Glass-Metal Seals: I. The Cylindrical Seal. F. W. Martin. *Journal of the American Ceramic Society,* v. 33, July 1, 1950, p. 224-229.

Consideration of the effects of viscous flow during cooling of a beaded wire seal following annealing treatment leads to a refinement of the theory of Hull and Burger. With the corrections provided, excellent correlation is obtained with experimental stress measurements. Cylindrical seals with metal as the external member. (K11)

378-K. Weld 3850-Ton Mechanical Press. Clyde B. Clason. *Welding Engineer,* v. 35, July 1950, p. 17-20.

Procedures and equipment used by Clearing Machine Corp., Chicago. (K general, T5, CN)

379-K. Building a Bull Gear. *Welding Engineer,* v. 35, July 1950, p. 21.

Use of submerged-melt welding in production of bull gear from ⅝-in. plate and 1-in. thick strip for the rim. (K1, T7, CN)

380-K. How Chevrolet Welds the "Powerglide". Stanley H. Brams. *Welding Engineer,* v. 35, July 1950, p. 22-24.

Various steps, including electric welding, spot welding, and brazing. (K1, K3, K8, T21, ST)

381-K. Big Diesel Repair Job. *Welding Engineer*, v. 35, July 1950, p. 25.
Arc welding repair of large break in 800-hp. diesel. (K1, T25, CN)

382-K. Low-Cost Welded Stadium. R. G. Swisher. *Welding Engineer*, v. 35, July 1950, p. 32-33.
Arc-welded steel grandstands made by Pittsburgh-Des Moines Steel Co. Patented design utilizes standard units. (K1, T26, CN)

383-K. Welded Portable Repair Shop. Charles W. Harbaugh. *Welding Engineer*, v. 35, July 1950, p. 34-35.
(K general, T5, CN)

384-K. Solvent Extractor Stud Welded. *Welding Engineer*, v. 35, July 1950, p. 42.
How welding 2500 threaded studs to frame members of stainless-steel equipment eliminated time-consuming drilling and tapping, and sharply reduced the amount of stainless needed. (K1, SS)

385-K. Hints for White Metal Welding. *Linde Tips*, and *Oxy-Acetylene Tips*, v. 29, July 1950, p. 53-56.
Recommended procedures.
(K2, Sn, Pb, Sb)

386-K. Argon Arc Welding. *Light Metal Age*, v. 8, June 1950, p. 14-15.
Commercial practice as applied to aluminum. (K1, Al)

387-K. Solid-Phase Hot Pressure Welding. Gilbert C. Close. *Finish*, v. 7, July 1950, p. 19-21, 73-74.
Process and some equipment used for specific jobs. Basic advantages and applications. Mentions only use for joining various steels. (K2, SS)

388-K. Engineering Trends in Spot Welder Controls. Stuart C. Rockafellow. *Electronics*, v. 23, July 1950, p. 70-73.
Techniques for building electronic controls that meet reliability and quick-repair requirements of auto-industry assembly lines. Details of 6-thyratron timer circuit having potentiometer control of time for each sequenced function of a resistance welder. (K3)

389-K. New Aluminium-Silicon Electrode. *Light Metals*, v. 13, June 1950, p. 352-354.
Use of Al-Si electrode, developed by a British firm, for welding of wrought alloys of specifications AW3, 9, and 10. (K1, T5, Al)

390-K. Welding and Cutting on the Sea Defence Works, Lowestoft. *Welder*, v. 19, Jan.-Mar. 1950, p. 2-5.
(K general, G22, CN)

391-K. Spotlight on Arc Welding. V. Winget Ltd., Rochester. *Welder*, v. 19, Jan.-Mar. 1950, p. 10-14.
Use by British firm in construction of civil-engineering equipment and concrete machinery.
(K1, T4, CN)

392-K. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part IV. R. Weck. *Welder*, v. 19, Jan.-Mar. 1950, p. 15-24.
Dynamic notch sensitivity of materials and fatigue strength of riveted and welded joints. Fatigue-test data for various welded cast irons and steels and various joint designs. (To be continued.)
(K9, Q7, ST, CI)

393-K. The Pressure-Welding Characteristics of Some Copper-Base Alloys. Edwin Davis and Eric Holmes. *Journal of the Institute of Metals*, v. 77, May 1950, p. 185-206.
Pressure welding characteristics of deoxidized copper and 9 commercial Cu-base alloys were determined by tensile testing and micro-examination of butt welds. Joint strength was influenced by surface condition before welding, mechanical preparation proving most suitable, and by deformation taking place during welding. Welding time, pressure, and temperature were of importance only in so far as they affected deformation, provided that welding temperature exceeded recrystallization temperature of the material. Order of weldability. 12 ref. (K2, Cu)

394-K. Copper Brazing of Case Hardening Steel. S. C. Churchill. *Machinery* (London), v. 76, June 22, 1950, p. 884-889.
Effects of the brazing temperature on case-hardening steel subjected to a variety of subsequent heat treatments. The specimens were tested for Izod impact and Vickers hardness. Recommendations.
(K8, J general, Q6, Q29, CN)

395-K. French Automatic Spot-Welding Machines. (In French.) J. Négre. *Soudure et Techniques Connexes*, v. 4, Jan.-Feb. 1950, p. 5-15.
Different types especially developed for existing industrial conditions in France. Low operating costs, independent of the amount of work performed. Electrical circuits and equipment. (K3)

396-K. Welding-on of Pins by Means of a Welding Gun. (In French.) J. Sarazin. *Soudure et Techniques Connexes*, v. 4, Jan.-Feb. 1950, p. 17-25; discussion, p. 25-28.
Method and apparatus for joining studs, bolts, pins, etc., of a wide variety of shapes and sizes to plane or curved surfaces. Assemblies utilizing numerous such joints. Results of uniaxial and biaxial tensile testing of typical joints. (K1)

397-K. Welding and Brazing by High-Frequency Current. (In French.) M. Descarsins. *Soudure et Techniques Connexes*, v. 4, Mar.-Apr. 1950, p. 65-75.
Application of the method of high-frequency induction heating to welding and brazing. Principles of this method; advantages and disadvantages; equipment. (K6, K8)

398-K. Tendency Toward Crack Formation of Light-Alloy Welded Structures. (In French.) Marc Hollard. *Revue de Métallurgie*, v. 47, Apr. 1950, p. 287-294.
Use of the method of Bollenrath and Cornelius for determination of cracking. Application of this method to different types of light alloys, including the technique of the procedure. Data of a typical test. 11 ref. (K9, Al)

399-K. Crack Sealing Torch; Its Use in the Fabrication of Special Steels. (In French.) Charles Marizy. *Revue de Métallurgie*, v. 47, May 1950, p. 395-398.
Its use for elimination of surface defects such as small cracks, blisters, scales, etc., in ingots of carbon and low-alloy steels. Method of use is described. (K2, CN, AY)

400-K. Wide-Seam Forehand Welding. (In French.) C. G. Keel. *Revue de la Soudure; Lastijdschrift*, v. 6, no. 1, 1950, p. 1-19.
Forehand welding using an appropriate weld metal and following with a short-time torch heat treatment at a temperature above the Ac_3 point. Optimum conditions of operation. Results of an extensive study of mechanical properties and structural characteristics of the welds.
(K2, CN)

401-K. Induction Soldering Process. (In German.) G. W. Seulen. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 92, May 11, 1950, p. 337-340.
Equipment and advantages. (K7)

402-K. Determination of the Suitability of Low-Carbon Steels for Fusion Welding. (In Czech.) Frantisek Poboril and Frantisek Sicha. *Hutnické Listy*, v. 5, Jan. 1950, p. 5-9; Feb. 1950, p. 57-61; Mar. 1950, p. 101-105.
On the basis of experimental evidence showing that in fusion welding, a sudden cooling down of certain low-carbon steels from temperatures in the vicinity of the Ac point results in a brittle zone in the transition range, a fusion-weldability test for steels was suggested. It consists in the quenching of a rough-machined impact-test specimen from a temperature just below the Ac_1 point, artificial aging at 100° C. for two hours, and determination of impact strength at the normal temperature. (K9, CN)

403-K. Argon-Arc Welding in Production of Thermostatic Elements. (In Russian.) A. Ya. Brodskii. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 37-40.
Technique using a tungsten electrode, developed as a result of experimental investigations. This method is also applicable to production of similar devices (membranes, diaphragms, aneroid capsules) having a right-cylindrical shape. Mechanical device to automatize welding is described and structural details are diagrammed. Material welded is 18-8 stainless steel. (K1, SS)

404-K. Progress in Development of Automatic Welding Under Flux During the Last Two to Three Years. (In Russian.) E. O. Paton and B. I. Medovar. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 28-36; Mar. 1950, p. 31-42.
Russian research as applied to carbon and low-alloy structural steels. Methods of stress relief, applicable mechanical tests and low-temperature applications (down to −45° C.). Second part: New equipment, tables, diagrams, and illustrations. (K1, ST)

405-K. Welding of Steels at Low Temperatures. (In Russian.) A. A. Chekanov. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 45-48.
Four different structural steels were welded at −40 to 18° C. and tested at −40° C. and room temperature. Mechanical properties were studied, as well as tendency toward crack formation. Method of investigation. (K general, CN)

406-K. Reaction of Phosphorus and Sulfur During Automatic Welding Under High-Manganese Fluxes. (In Russian.) K. V. Lyubavskii and M. M. Timofeev. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 5-11.
Results of several independent investigations of the reaction of phosphorus and sulphur both during melting of the flux and in the molten-metal pool formed at the point of welding. It was found that a P content of 0.13-0.15% causes an increase of content of this element in the weld metal by 0.020-0.025%. Methods of reducing P content of flux to 0.03-0.07%. Mechanism of transition of S from flux slag to weld, causing hot cracks, and methods for its elimination. 18 ref.
(K general, ST)

407-K. Conditions for Intermittent Spot Welding. (In Russian.) I. P. Trochun and G. V. Vasil'ev. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 11-14.
Method of welding characterized by interrupted application of the welding current, necessitated by a difference in the rate of heat transfer into the interior of the sheet and the rate of heat escape from the surface of the sheets through the electrodes. This method is recommended for low-carbon steel sheets of 3-10 mm. thickness. Special advantages. Optimum conditions of welding for different cases.
(K3, CN)

408-K. Weld Assembly of Steel Framework of High Buildings. (In Russian.) M. M. Sakhnovskii and A. D. Zevin. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 18-19.

Possibility of attaching horizontal braces to the body of columns in the framework of high buildings without use of the "overhead' welding position. Optimum gap between brace and column is indicated. Steel backings were found more applicable than asbestos or copper. (K general, T26, CN)

409-K. Electrical Characteristics of Spot Welding Machines and Their Influence on the Stability of the Welding Process. (In Russian.) L. V. Glebov. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 29-30.

Determining relation between various parameters of the machine and welding stability. Formulas developed are thoroughly discussed and verified experimentally. (K3)

410-K. Important Points To Consider in Welding Aluminum. Fritz Albrecht. *Machinery* (American), v. 56, July 1950, p. 168-170.

Selection of filler material, nature of material to be joined, and factors affecting welding methods. (K general, Al)

411-K. Applications for Helium in Inert-Arc Welding. M. J. Conway. *Welding Journal,* v. 29, July 1950, p. 533-536.

Historical review stresses the advantages of helium in inert-gas shielded-arc welding and its promising future. (K1)

412-K. Portable Resistance-Welding Tools. Charles H. Davis, Jr. *Welding Journal,* v. 29, July 1950, p. 537-541.

Various types of equipment. Coordination of product and design, other considerations affecting design, materials for tool construction, and tool supports. Practical shortcuts. (K3, T5)

413-K. Shielded Arc Welding of Aluminum. Fritz Albrecht. *Welding Journal,* v. 29, July 1950, p. 542-546.

Typical argon-shielded, a.c. arc welding operations on aluminum and savings realizable in comparison with oxy-hydrogen torch welding. (K1, Al)

414-K. Slope Control and Its Effect on Spot Welding. J. L. Solomon. *Welding Journal,* v. 29, July 1950, p. 578-579.

Discusses paper by Ivar W. Johnson (Oct. 1949 issue, item 22A-238, 1949). Shows that, although addition of slope control to a single-phase welder allows one to simulate the heating effect produced naturally by the 3-phase welding current, the welding of Al to ANW-30 specifications requires also addition of current-decay control. This latter control allows the spot to cool at a slow rate, minimizing porosity, sheet separation, and internal cracks. (K3, Al)

415-K. Resistance Welding Hot Air Heating Chamber. H. W. Stieglitz. *Welding Journal,* v. 29, July 1950, p. 580-582.

Equipment and procedures for welding chamber used in gas furnaces, at high production rates. The chamber consists of three closely spaced sections linked by a number of tubular flues. (K3, T27, ST)

416-K. Automatic High-Speed Welding of Small-Diameter Joints. *Welding Journal,* v. 29, July 1950, p. 582.

Equipment and procedure for attaining high-production speeds yet sound joints in the arc welding of universal yokes to each end of 2¾-in. diam. automobile shafts. (K1, T21, ST)

417-K. How To Fusion Weld Cast Iron. F. C. Geibig. *Welding Journal,* v. 29, July 1950, p. 583-587.

Recommended procedures for the repairman for the three types (white, gray, and malleable) on both small and large parts. (K2, CI)

418-K. Shrinkage Distortion in Welding. W. Spraragen and W. G. Ettinger. *Welding Journal,* v. 29, July 1950, p. 323s-33bs; discussion, p. 335s.

Reviews and correlates literature from Jan. 1, 1944 to July 1, 1949 (foreign literature from Jan. 1, 1941). Includes brief comment by H. Weisberg. 33 ref. (K general)

419-K. Underbead Cracking of Welds Cathodically Charged Witn Hydrogen. M. W. Mallett and P. J. Rieppel. *Welding Journal,* v. 29, July 1950, p. 343s-347s.

Most of the tests were made on heat treated Mn-Mo steel. A few tests were made on 18-8 stainless steel plate, ship-plate steel "as-received", and on homogenized samples of Mn-Mo steel and ship plate. Procedure and results. Proposes a theory of underbead cracking. 14 ref. (K9, ST, AY)

420-K. Mechanical and Material Variables Affecting Correlation. Carl E. Hartbower and William S. Pellini. *Welding Journal,* v. 29, July 1950, p. 348s-360s.

Mechanical and material variables which affect correlation of performance between small-scale specimens and complex structures were studied. Relative performance of welded and unwelded V-notch Charpy and nick-bend specimens was compared with that of welded 9-ton box girders. Complex interplay of mechanical and material variables precludes correlation except in a very approximate sense. Numerous graphs, tables, diagrams, and illustrations. (K9, CN)

421-K. Corrosion Resistant Liners in Refinery Vessels. G. C. Carpenter. *Petroleum Refiner,* v. 29, July 1950, p. 95-103.

See abstract of "New Techniques for Lining Vessels for Protection Against Corrosion", *Petroleum Processing,* item 51-K, 1950. (K1, T29, SG-g)

422-K. Fast Welding Stops Rejects. *Product Engineering,* v. 21, July 1950, p. 92-93.

In production of household water filter, argon-shielded arc welding is now used in place of silver brazing for joining stainless steel. (K1, SS)

423-K. Copper Paste Lowers Brazing Costs. Dan Reebel. *Steel,* v. 127, July 17, 1950, p. 82-83, 98.

National Cash Register method provides tighter joints, increased furnace production, and requires less hand labor. Savings range up to $3.15 per 100 on business-machine parts. The paste consists of a jellied petroleum material of low ash content, containing red Cu oxide in a fine state of subdivision. (K8)

424-K. Effect of Welding on Pressure-Vessel Steels. A. F. Scotchbrook, L. Eriv, R. D. Stout, and B. G. Johnston. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 539-548.

Results of a study using the Lehigh slow notched-bend test to determine the effects of welding on as-received and prestrained plate. Effects of different heat inputs in welding, of plate thickness, of carbon content and deoxidation practice, and of heat treatment after welding. Six plain carbon steels were tested. (K9, Q5, T26, CN)

425-K. Welding, Brazing, Soldering Beryllium Copper. II. John T. Richards. *Welding Engineer,* v. 35, July 1950, p. 36-39, 56.

Recommended procedures for high and low-temperature silver brazing and resistance welding. Table gives effects of low-temperature silver brazing on hardness of Be-Cu strip subjected to a wide variety of annealing, cold-rolling, and aging schedules. (To be concluded.) (K general, Cu)

426-K. Assessment of Welding. J. Derrix. *Welding,* v. 18, June 1950, p. 261-264.

Weld efficiency and design, especially in relation to certain classes of pressure vessels. Unless the true value of a sound weld is better appreciated, a danger exists that the low design values at present in force will hinder the extended use of weld fabrication. (To be continued.) (K9)

427-K. (Book) **Electric Resistance Welding.** H. E. J. Butler. 173 pages. George Newnes, Ltd., Tower House, Southampton St., Strand, London W.C. 2, England. 17s., 6d.

All the main resistance welding processes namely, spot, seam, projection and butt welding. Does not cover hot riveting, electrical resistance brazing, and bar heating. Elementary principles of welding, the types of machines available, and electrodes and control gear. Lacks information on the jigs and tools required in mass production. (From review in *Welding.*) (K3)

428-K. (Book) **Gas Welders' Tables and Data.** E. Molloy, editor. 160 pages. George Newnes, Ltd., Tower House, Southampton St., Strand, London W.C. 2, England.

Handbook is divided into six main sections; welding equipment, welding methods, oxygen cutting, rods and fluxes, hard surfacing, and miscellaneous. It is mainly based upon manufacturers' data. (From review in *Welding.*) (K2)

429-K. (Book) **Neue Erkenntnisse und Entwicklungen beim Schweissen von Eisenwerkstoffen.** (New Developments and Progress in the Welding of Ferrous Materials). K. L. Zeyen. 214 pages. Carl Hanser Verlag, Munich 27, Germany. 10.80 DM.

Surveys development of arc welding during the war years and the post-war era. One of its main objects is to inform German technicians of the latest developments in Britain and the U. S. Deals with weldability, the fabrication of alloy steels, and recent trends in electrode production. Economies possible by the use of special rolled sections and certain types of joint preparation. Bibliography of over 200 references. (From review in *Welding.)* (K1, Fe)

L CLEANING, COATING AND FINISHING

425-L. Fitting Hard Chromium Plating to the Job. Gilbert C. Close. *Steel Processing,* v. 36, June 1950, p. 281-284.

The various physical and chemical properties of electrodeposited Cr and the value of these properties in certain industrial applications. Describes typical uses as a general guide to design and production engineers. (L17, T general, Cr)

426-L. Applications of Corrosion Resistant Coatings. C. M. Jekot. *Organic Finishing,* v. 11, June 1950, p. 14-17.

As applied to vessel linings in the food, beverage, chemical, and transportation industry. (L26, T29)

427-L. Metal Powder Parts Successfully Plated by New Process. Jerome

F. Kuzmick. *Materials & Methods,* v. 31, June 1950, p. 54-56.

Use of heat treatment to remove residual plating salts as a means of eliminating "spotting-out" defect encountered in electroplating porous-metal compacts. Process, known as Etolizing, has been successfully applied to coating of porous iron, brass, and bronze with Cu, Ni, Ag, Cu-Ni, and Cu-Sn, also Cr under certain conditions. (L17, Fe, Cu)

428-L. Automatic Finishing of Air-Way Sanitizors. F. H. Burmeister. *Industrial Finishing,* v. 26, June 1950, p. 18-20, 22.

How die-cast and sheet-metal parts for vacuum cleaners are cleaned, spray painted with hammered-effect finish, and baked in a conveyerized setup. (L26)

429-L. Painting Aluminum Parts for KoolVent Awnings. Walter Rudolph. *Industrial Finishing,* v. 26, June 1950, p. 24-26, 28.

Production cleaning, surface treatign, drying, spray painting, and baking. (L26, Al)

430-L. Color Litho Process for Steel Drums. *Industrial Finishing,* v. 26 June 1950, p. 29-30.

Process which prints up to four colors on heavy-gage steel which later is formed into shipping drums. (L26, CN)

431-L. Reconditioning and Refinishing the Navy's Al Alloy Airplane Propellers. Howard E. Jackson. *Industrial Finishing,* v. 26, June 1950, p. 32-34, 36, 38, 40.

Removing paint, filing, grinding and buffing blades to remove all pitting; cleaning metal surfaces; spray painting blades in black; and applying yellow markings. (L26, L10, T24, Al)

432-L. 55-Gallon Drums Now Lithographed. *Modern Lithography,* v. 18, June 1950, p. 28-30; **Lithographing—75 Ton Per Hour.** *National Lithographer,* v. 57, June 1950, p. 36, 89.

New process and equipment. (L26, T26, ST)

433-L. Flame Spraying of Plastics on Metals. J. A. Neumann. *Industry & Welding,* v. 23, July 1950, p. 36-39, 54-55.

(L26)

434-L. Modern Composite Metals. Sidney Siegel. *Journal of Metals,* v. 188, July 1950, p. 916-920.

Fundamental theories and commercial methods for production of clad metals or bimetallic sheets, in which dissimilar metal layers are caused to form continuous metallic bonds. (L22)

435-L. Immersion Tube Heating of Water and Solutions. II. (Concluded.) Maurice J. Dewey. *Industrial Heating,* v. 17, June 1950, p. 1002, 1004, 1006, 1008.

Design of immersion-heating surfaces, fabrication of immersion tubes for various surfaces, safety controls, and heating of plating solutions. (L17)

436-L. Combination Spray Booth-Dryer Speeds Refinishing of Railroad Rolling Stock in the Shops of the Chicago, Rock Island & Pacific Railroad. *Industrial Heating,* v. 17, June 1950, p. 1042-1044, 1046, 1048-1051.

Same units serve as spray booths and bake ovens. (L26, T23)

437-L. Electroplating. C. L. Faust and W. H. Safranek. "Encyclopedia of Chemical Technology". Vol. 5, 1950 (Interscience Encyclopedia, Inc., New York), p. 611-646.

A descriptive review. 115 ref. (L17)

438-L. Hardfacing. N. H. Cuke. *Canadian Metals,* v. 13, June 1950, p. 39-41.

The various types of allovs used, and their applicabilities to different jobs. (L24, SG-m)

439-L. Surface Treatment and Finishing of Light Metals: Part 5. (Continued.) S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 27, June 1950, 553-557.

Chemical-oxidation treatments for tubes; phosphate process, and bonderizing. Compares chemical oxide conversion coatings. 109 ref. (L14, Al)

440-L. Vitreous Enamelling of Light Alloys. R. P. Fraser, A. L. Ciancni, and J. M. Connor. *Foundry Trade Journal,* v. 88, June 1, 1950, p. 591-598.

See abstract from *Sheet Metal Industries,* item 372-L, 1950. (L27, Al)

441-L. Gas-Pickling of Steel. J. Pearson, W. Bullough, and T. C. Canning. *Journal of tne Iron and Steel Institute,* v. 165, June 1950, p. 185-190.

Treatment of steel strip in atmospheres containing gaseous HCl has been practiced in the U. S. for preparing the material for subsequent hot galvanizing. Laboratory investigations confirmed the fact that galvanized coatings adhere more tightly to steel prepared in this way than to steel pickled in aqueous H_2SO_4. The process is, however, suitable only for steel which can be heated to temperatures of about 750° C. without loss of required properties. (L12, L16, CN)

442-L. Mechanical Giant Plates Chrome on Stainless. H. E. Head. *Iron Age,* v. 165, June 29, 1950, p. 65-68.

Straight-line, mass-production techniques at Briggs which make possible production of 3000 complex welded and Cr-plated, stainless steel assemblies per day. Features include polishing prior to forming and use of the world's largest automatic machine for the plating process. (L17, Cr, SS)

443-L. Plastic-Coated Steel Resists Corrosion. *Iron Age,* v. 165, June 29, 1950, p. 71.

Use of vinyl plastic as a protective coating for steel exposed to underwater corrosion. Tests show effectiveness. (L26, ST)

444-L. Electroplated Phosphorus Alloys Give Hard Coat. *Iron Age,* v. 165, June 29, 1950, p. 78.

Commercial method developed by National Bureau of Standards for producing electrodeposits of Co or Ni alloyed with 15% P. (L17, Co, Ni)

445-L. Diaphragm Tanks Promote Plating Progress. Ezra A. Blount. *Products Finishing,* v. 14, July 1950, p. 12-24.

Diaphragm tanks are used for elimination of deposit roughness and improvement of deposit quality in high-speed cyanide Cu-plating solutions. The same principle can also be applied to other plating solutions such as silver, brass, zinc, cadmium, and particularly bright nickel. (L17)

446-L. Belt Polishing and Dip Finishing Door Chimes. William R. Cutter. *Products Finishing,* v. 14, July 1950, p. 28-32, 34.

Equipment and procedures of NuTone, Inc. Chimes are made from seamless brass tubing. (L16, L10, Cu)

447-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 14, July 1950, p. 50, 52, 54, 56, 58, 60, 62, 64, 68, 70, 72.

Under the heading, "Factors Affecting the Adhesion of Organic Coatings", a recent paper by Charles J. Marsel is thoroughly reviewed. Includes surface preparation for good adhesion and methods for evaluation of adhesion of organic coatings. Under "Passivity in Chromium Plating Operations", a paper by R. O. Hull and J. B. Winters is briefly outlined. Recommendations for avoidance of production losses due to passivity when plating chromium over nickel. (L17, L26, Ni, Cr)

448-L. Infra-Red Oven Removes Grease From Floor Furnace Parts. *Products Finishing,* v. 14, July 1950, p. 74, 76.

Improved method for degreasing sheet-metal parts used in the manufacture of floor furnaces. (L12)

449-L. How Briggs Chrome Plates Stainless Assemblies. Herbert E. Head. *Steel,* v. 127, July 3, 1950, p. 82-84.

Equipment and procedures applied by Briggs Mfg. Co. to decorative trim for automobiles. (L17, T21, Cr, SS)

450-L. Induction Furnace Cuts Zinc Loss. Edward W. Burd. *Steel,* v. 127, July 3, 1950, p. 88-90, 92.

How application of low-frequency electric induction principles to production galvanizing holds metal loss to a small fraction of previous loss patterns and concentrates great working capacity in a small area. (L17)

451-L. Nickel Immersion Coatings by Electrochemical Displacement and by Chemical Reduction. W. A. Wesley. *Plating,* v. 37, July 1950, p. 732-734, 756.

Processes and properties of the deposits. Presents unbiased comparison with electrodeposited coatings. Surveys potential applications. (L16, Ni)

452-L. Determination of Free Cyanide and Ammonia in Brass and Bronze Plating Baths. Part II. Experimental Evaluation of Present Methods and Recommended Procedures for Free Cyanide Determination. Samuel Heiman. *Plating,* v. 37, July 1950, p. 745-748, 756.

(To be continued.) (L17, S11, Cu)

453-L. Porosity of Electrodeposited Metals. VIII. Loss of Weight, Increase of Permeability, and Failure of Electrodeposited Coatings. IX. The Effect of Certain Aromatic Polysulfonates on the Permeability and Corrodibility of Electrodeposited Nickel Foils. N. Thon, Ling Yang, and Denis Keleman. *Plating,* v. 37, July 1950, p. 749-753.

Results of experimental investigation of deep and surface corrosion, corrosion through coatings, mechanism of corrosion, etc., of electrodeposited Ni on Fe, using various baths and thicknesses. Ni foils produced in standard Watts baths with and without above addition agents were tested for corrodibility and permeability. All four of the agents resulted in increased corrodibility in an atmosphere saturated with HCl vapor. (L17, R1, Ni)

454-L. A Rust-Preventing Pickling Inhibitor. Karl F. Hager and Morris Rosenthal. *Corrosion* (Technical Section), v. 6, July 1950, p. 225-231.

Use of "Emulphor STH", a wetting agent which belongs to a new class of pickling inhibitors and which gives excellent metal-surface protection against H_2SO_4 attack without altering the rate of acid attack against the oxide appreciably. It also shows excellent adhesion to the metal surface so that "after-treatment" may be delaved several days without rerusting of the metal. Properties of inorganic and organic inhibitors. (L12, Fe)

455-L. Theory of the Electrodeposition of Metals From Aqueous Solutions. Colin G. Fink. *Science,* v. 112, July 7, 1950, p. 12.

Summarizes six means for control of thickness of the active cathode surface layer, necessary for satisfactory metal deposition. (L17)

456-L. Plating of Stainless Steel. Joseph Haas. *Ameircan Machinist,* v. 94, July 10, 1950, p. 125, 127.

Methods, recommendations, and patents. (L17, SS)

457-L. Vinyl Finishes for Aluminium Alloys. W. A. Edwards. *Light Metals,* v. 13, June 1950, p. 336-339.

Tests on a new type of stoving lacquer of superior mechanical and surface-protecting properties. Ease and economy of application. (L26, Al)

458-L. From a Metallurgist's Notebook: Chromating. H. H. Symonds. *Metal Industry,* v. 76, June 23, 1950, p. 490.

Experiments carried out to ascertain the cause of the inconsistent response to chromating of zinc-base die castings. (L14, Zn)

459-L. The Engineering Implications and Economics of Surface Preparation of Mild Steel Prior to Fabrication. W. A. Johnson. *Institution of Mechanical Engineers, Proceedings,* v. 162, no. 1, 1950, p. 49-56; discussion, p. 56-65.

See abstract of condensed version in *Engineer,* item 7B-245, 1949. (L26, T26, CN)

460-L. Application of Electropolishing to Study of the Chromizing of Steels. (In French.) P. Galmiche. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 65-66.

According to the method described, the exact amount of Cr in the chromized layer may be determined by means of its removal by electropolishing accompanied by X-ray diffraction analysis. (L15)

461-L. Electropolishing and Vacuum Technique. (In French.) Pierre Nineuil. *Vide,* v. 5, May 1950, p. 807-813.

Principles of electropolishing and its application to the finishing of structural parts of electron tubes. The technique used. (L13, T1)

462-L. Effect of Inhibitors on the Acid Pickling of Steel. Part I. (In Polish.) M. Smialowski and J. Foryst. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 147-153.

Experiments to determine the inhibition efficiency of dibenzylsulfide, dibenzylsulfoxide and thiocarbanilide in the acid pickling of iron, steel, and other metals. Results show that the action of inhibitors is more chemisorption than pure physical sorption, and that this phenomenon is related to the ability of some metals (particularly Ni, Co and Fe) to become passive. 11 ref. (L12, ST, Fe)

463-L. Anodic Process During Electropolishing of Copper in a Solution of Orthophosphoric Acid. (In Russian.) K. P. Batashev and E. N. Nikitin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Mar. 1950, p. 263-270.

Analysis of the products of anodic solution indicated that the secondary copper phosphate is formed in the initial stage of electropolishing and the tertiary in the final stage. Mechanism of electropolishing is explained in accordance with the shape of the potential curves obtained. Thermodynamically calculated static potentials of Cu in solutions of its phosphates are confirmed experimentally. 10 ref. (L13, Cu)

464-L. "Agate" Chromium Plating. (In Russian.) V. T. Safron'ev. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 21.

Method of obtaining an "agate-chromium" finish on metal (steel, bronze, copper, brass, silver, or alloy steel). This is a beautiful, decorative figured pattern giving the part the appearance not of a metal, but of a mineral similar to polished agate or jade. Corrosion resistance of the finish is good. (L17, Cr)

465-L. How Aircraft Engine Parts Are Barrel Finished. Dudley J. Kaharl. *Iron Age,* v. 166, July 13, 1950, p. 81-83.

Methods applied to Al and steel parts by Pratt & Whitney Aircraft Div. (L10, ST, Al)

466-L. Acid Baths Offer Electroplating Advantages. J. B. Moller. *Iron Age,* v. 166, July 13, 1950, p. 92-95.

Though there are only a few practical acid electroplating baths, their use with small amounts of noble metal addition agents creates many new alloy compositions and permits new control methods. Acid plating solutions operate at higher anode and cathode efficiencies than do alkaline baths. They are not subject to typical alkaline decomposition. (L17)

467-L. Metal Spraying of High-Temperature Metals and Alloys. Robert T. Thurston and John Wulff. *Welding Journal,* v. 29, July 1950, p. 313s-319s.

Hydrostatic-bursting technique developed to measure the strength of sprayed deposits. With this technique, a relationship was shown to exist between oxide content and strength of sprayed metal. Sintering of sprayed-metal deposits in hydrogen, especially in the presence of a liquid phase, was successfully accomplished, resulting in significant increases in density and bursting strength. The materials investigated were Mo, Ni, Mo-Ni alloys, Hastelloy C, Vitallium, and CM-469 (60% Cr, 25% Mo, and 15% Fe.) (L23, SG-h, Mo, Ni, Co, Cr)

468-L. Determination of the Temperature of Sprayed Metal Particles. James E. Cline, Robert T. Thurston, and John Wulff. *Welding Journal,* v. 29, July 1950, p. 320s-322s, 342s.

Development of thermocouple and colorimeter technique for determining the heat content and temperature of sprayed metal particles at the moment of impact. The investigation includes tests made with Zn, Al, Cu, Ni, Fe, and Mo. Results indicate that the metal particles are at their melting point at impingement. Calculations show that the contribution of kinetic energy is negligible. (L23, S16)

469-L. The Anode Layer in the Electrolytic Polishing of Copper. H. F. Walton. *Journal of the Electrochemical Society,* v. 97, July 1950, p. 219-226.

Viscosities and electrical conductivities of solutions of $CuHPO_4$ in aqueous phosphoric acid and phosphoric acid-glycerol-ethylene glycol mixtures were measured as an aid in investigating the anode layer formed when Cu is electropolished in these solutions. Cu concentrations near the anode during electrolysis were measured, and current-voltage relationships were studied using a rotating Cu anode. Effective thickness of the anode layer was estimated to be about 10^{-3} cm. 18 ref. (L13, Cu)

470-L. Gold-Plated Electrode for Measurement of Conductance of Electrolytes. Sidney Barnartt. *Journal of the Electrochemical Society,* v. 97, July 1950, p. 235-236.

Electrodes for conductance measurements by the Kohlrausch method were prepared by electrodepositing finely divided gold over a layer of smooth gold. Their behavior was studied over the frequency range 1-10 kc. per sec. Polarization resistance was found to be relatively small and in conformity with the Warburg relationship. 11 ref. (L17)

471-L. Metal Coatings on Ceramic Bodies; and Joining Ceramic Objects With Each Other, With Metal, or With Glass. (In German.) Hans J. Karmaus. *Sprechsaal für Keramik; Glas; Email,* v. 83, Apr. 20, 1950, p. 141-145.

Various methods are described in considerable detail. (L general, K11)

472-L. Effects of Metallurgical Conditions on the Enameling of Cast Iron. (In German.) A. Köniğer. *Neue Giesserei,* v. 37 (new ser., v. 3), Apr. 6, 1950, p. 125-136; Apr. 20, 1950, p. 148-157; May 4, 1950, p. 168-176.

Various types of defects in enameled surfaces. Properties of cast iron and its preliminary treatment as causes of such defects were investigated. Experiments on effects of iron composition and preliminary treatment. Final installment: Effects of surface-layer composition and of sulfur from the molding sand on the enameled surface. The necessity of reducing the S content of the melt, or of melting at a high temperature in order to prevent precipitation of sulfide crystals before pouring. 18 ref. (L27, E11, CI)

473-L. Bimetallic Contacts. (In German.) H. Kalpers. *Metall,* v. 4, May 1950, p. 193-195.

Contacts consist of base metals plated with nobler metals by mechanical means (as rolling) at elevated temperatures. Different types of bimetals, the effect of rolling on their hardness, and their economic and technical advantages. Special problems such as bending, embossing, drawing, and riveting. (L22, F23, SG-r)

474-L. (Book) Industrial Electrochemistry. Ed. 3. Charles Letman Mantell, 781 pages. 1950. McGraw-Hill, 330 West 42nd St., New York 18.

Theoretical and technical electrochemistry, electrolytics, electrothermics, electrochemistry of gases, and engineering. Various types of processes, their applications and products, equipment and methods for each, and a large amount of technical and operating data. Footnote references. (L17, C23, P15)

475-L. (Book) Metal Finishing Handbook. P. A. Cartwright. 216 pages. 1950. Blackie and Son, Ltd., 66 Chandos Place, London, W.C. 2, England.

Processes used in providing permanent metal-protective finishes. Pretreatment of metal surfaces by grinding, polishing, burnishing, chemical cleaning, pickling, scratch-brushing, and stripping. Electroplating, and the electrodeposition of metals such as nickel, copper, chromium, cadmium, zinc, lead, etc., also decorative plating processes. Metal coloring by bronzing, oxidizing, blueing, lacquering, coloring of silver, gold, tin, nickel, aluminum, etc. Brief description of phosphate and allied coatings. Testing of coatings for adhesion, thickness, porosity, and corrosion resistance. (L general)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

202-M. The Effect of Cold-Work Distortion on X-Ray Patterns. B. E. Warren and B. L. Averbach. *Journal of Applied Physics,* v. 21, June 1950, p. 595-599.

With modern experimental technique, it is possible to measure a peak shape with sufficient accuracy to justify an interpretation based on the precise shape of the reflection. The corrected shape is represented by a cosine Fourier series and a set of A_n coefficients determined. A plot of A_n coefficients vs. n will distinguish between distortion and particle-size broadening. From the coefficients, root-mean-square

values of strain are obtained. Decrease in these values for increasing length is a direct indication of nonuniform nature of the strains in cold worked metal. (M22, Q24)

203-M. Grain Size Effect in Creep of Austenite. *Metal Progress,* v. 57, June 1950, p. 798, 800, 802. Translated and condensed from "Grain Size of High-Alloy Austenite as a Factor in Its High-Temperature Strength", A. M. Borzdyka.

Previously abstracted from *Izvestiya Akademii Nauk SSSR.* See item 4B-69, 1949. (M27, Q3, SS)

204-M. Magnetic Test for Hardenability. *Metal Progress,* v. 57, June 1950, p. 816, 818, 822, 824, 826, 830, 834, 836, 838. Translated and extracted from "Determination of the Depth of Penetration of the Martensitic Zone in Hardened Steels by a Magnetic Method", M. V. Dekhtyar.

Previously abstracted from *Zhurnal Tekhnicheskoi Fiziki.* See item 108-M, 1950. (M23, J26, ST)

205-M. Ternary Compound Formation of Aluminum Alloys. *Industrial Heating,* v. 17, June 1950, p. 1068. Condensed from paper by D. W. Wakeman and G. V. Raynor.

Experimental studies of the Al-Mn-Mg and Al-Mn-Ag systems made in connection with the role of transitional metal solutes in Al-rich alloys. (M24, Al)

206-M. Micrographic Detection of Temper Brittleness in Low-Alloy Steels. P. A. Jacquet. *Sheet Metal Industries,* v. 27, June 1950, p. 511-512.

Electropolishing technique and its application to two commercial steels. (M21, AY)

207-M. On the Stresses and Energies Associated With Inter-Crystalline Boundaries. J. H. Van Der Merwe. *Proceedings of the Physical Society,* v. 63, sec. A, June 1, 1950, p. 616-637.

Models, largely based on the assumptions introduced by Peierls and Nabarro in dealing with a single dislocation, are used in calculations on three types of intercrystalline boundaries, namely, a boundary due to a difference of atomic spacing, a twist boundary, and a symmetrical tilt boundary. Application of the results to the theory of orinated overgrowths, developed by Frank and the present author. 16 ref. (M26, Q24)

208-M. Inhomogeneity of Deformation in Metal Single Crystals. R. W. K. Honeycombe. *Proceedings of the Physical Society,* v. 63, sec. A, June 1, 1950, p. 672-673.

Results of an investigation of local orientation changes in deformed Al crystals by means of a modification of the Berg method. (M26, Q24)

209-M. Some Effects of Austenitic Grain Size and Metallurgical Structure on the Mechanical Properties of Steel. G. M. Sinclair and T. J. Dolan. *American Society for Testing Materials,* Preprint 15, 1950, 30 pages.

Studies were made of SAE 1045, 2340 and 3140 steels to determine changes in mechanical properties accompanying large increases in austenitic grain size. Each of the steels was heat treated to produce two general types of microstructure. Influence of austenitic grain size on both pearlitic and tempered martensitic types of microstructure at the same hardness level was investigated. 50 ref. (M27, Q general, ST)

210-M. X-Ray Study of the Sigma Phase in Various Alloy Systems. Pol Duwez and Spencer R. Baen. *American Society for Testing Materials,* Preprint 47, 1950, 7 pages.

Critically reviews X-ray diffraction data on the sigma phase in the binary alloys of Fe, Co, Ni, Cr, and V. Although the crystal structure of the sigma phase is still unknown, a tentative tetragonal unit cell is suggested to describe the structure, at least as a first approximation. On the basis of this cell, lattice parameters of the various binary sigma phases are computed. The case of a ternary sigma solid solution in the Fe-Cr-Mo system, and the influence of Mo on the lattice parameter of sigma. (M26, Fe, Co, Ni, Cr, V)

211-M. Identification and Mode of Formation and Re-Solution of Sigma Phase in Austenitic Chromium-Nickel Steels. E. J. Dulis and G. V. Smith. *American Society for Testing Materials,* Preprint 50, 1950, 27 pages.

A comprehensive investigation of the etching characteristics of the several phases occurring in austenitic stainless steels, supplemented by X-ray diffraction and magnetic-permeability studies. Suggests procedures by which sigma, carbide, and ferrite phases can be differentiated, with certain exceptions, under the microscope. Mode of formation and re-solution of sigma. Transient formation of ferrite was detected during re-solution of sigma at a temperature above its stable range. 10 ref. (M26, N8, SS)

212-M. Sigma Phase and Other Effects of Prolonged Heating at Elevated Temperatures on 25 Per Cent Chromium, 20 Per Cent Nickel Steel. G. N. Emmanuel. *American Society for Testing Materials,* Preprint 52, 1950, 18 pages.

Mechanical properties, identification of sigma phase, and grain growth. 13 ref. (M26, N3, Q general, SS)

213-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials,* Preprint 103, 1950, 53 pages.

Includes first progress report of Subcommittee XI on Electron Microstructure of Steel. A series of pieces of eutectoid steel were heat treated to specific microstructures. These pieces were divided into specimens which were supplied to 12 cooperating laboratories for electron microscope study. An extensive series of comparative electron and light micrographs illustrates the various structures observed. (M21, ST)

214-M. A High-Temperature Debye-Scherrer X-Ray Camera. E. C. Williams. *Journal of Scientific Instruments,* v. 27, June 1950, p. 154-157.

Camera designed primarily for Debye-Scherrer examination at high temperatures of flat solid specimens, using side-reflection technique. In metallography such specimens are sometimes preferable to powders, and they permit direct temperature measurement by means of an attached thermocouple. Mechanism which also provides simple rotation for powder specimens and independent azimuthal oscillation so that the camera may be used for X-ray spectroscopic analysis. (M22, S11)

215-M. The Structure of Co_2Al_5. (In English.) Audrey M. B. Douglas. *Acta Crystallographica,* v. 3, Jan. 1950, p. 19-24.

Results of the electron counts, and also forms of the first prominent Brillouin zones for both Co_2Al_5 and Co_2Al_5 are in agreement with the hypothesis that in electron-rich phases transition elements absorb electrons from the structure as a whole. 25 ref. (M26, Co, Al)

216-M. Compounds of Uranium With the Transition Metals of the First Long Period. (In English.) N. C. Baenziger, R. E. Rundle, A. I. Snow, and A. S. Wilson. *Acta Crystallographica,* v. 3, Jan. 1950, p. 34-40.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2598, item 17-M, 1950. (M26, U)

217-M. The Borides of Some Transition Elements. (In English.) Roland Kiessling. *Acta Chemica Scandinavica,* v. 4, No. 2, 1950, p. 209-227.

Includes the metals Cr, Mn, Ni, Zr, Cb, Mo, Ta, W, and Th. Phase analyses and structure determinations of the intermediary phases. Survey of results including a discussion of the structures, including some reported by other investigators. 34 ref. (M26, B)

218-M. The Bismuth Sulfide-Antimony Trisulfide System Bi_2S_3-Sb_2S_3. (In German.) Rudolf Vogel and Walter von Mässenhausen. *Zeitschrift fur Metallkunde,* v. 41, Mar. 1950, p. 75-80.

Composition of different equilibrium phases at specific points in the Bi-Sb-S system, and structure of the Bi-rich Bi-S alloys. 18 ref. (M24, Bi, Sb, S)

219-M. Measurement by Means of an Interference Counting Tube of the Diffuse Dispersion of X-Rays by Crystals and the Effect of a Plastic Deformation on Them. (In German.) Gustav Wagner and Albert Kochendorfer. *Annalen der Physik,* ser. 6, v. 6, Sept. 19, 1949, p. 129-145.

Investigated on Zn monocrystals and Al polycrystals. Apparatus and procedure. 35 ref. (M22, M26, Zn, Al)

220-M. The Intergrowth of Copper With Its Lower Oxide. (In German.) Erich Menzel. *Annalen der Physik,* ser. 6, v. 5, Nov. 26, 1949, p. 163-180.

Crystallography as a specific example of the combination of two cubic lattices with different lattice constants, and because its clarification is basic to measurement of the rectifier effect of monocrystalline specimens and thus may explain the mechanism of blocking-layer rectifiers. 18 ref. (M26, Cu)

221-M. Possible Dependence of Structure on Metal-Electrode Potentials. (In German.) Wolfgang Lorenz. *Zeitschrift fur Naturforschung,* v. 5a, May 1950, p. 283-291.

Dependence of metal-electrode potential on crystal size and crystallographic surface structure. Conclusions based on the statistical-thermodynamic theory of electrode potentials, the Kossel-Stranski crystal-growth theory, and some results of electron-emission investigation. 80 ref. (M26, P15)

222-M. Micrographic Study of the Surface Structure of the Copper-Zinc Solid Solution Subjected to Abrasion. (In French.) P. A. Jacquet. *Metallurgia Italiana,* v. 42, Feb. 1950, p. 43-49.

Surface perturbations (strain hardening) induced on a Cu-Zn alloy by abrasion with emery paper. Micrographic technique designed to disclose even extremely small amounts of plastic deformation, based on anodic etching in a very dilute aqueous solution of sodium hyposulfite. Different phenomena of deformation by abrasion, which are also interesting from the standpoint of the mechanism of creep deformation. The corrosion phenomenon. 15 ref. (M27, Q9, Q3, Cu, Zn)

223-M. Study of Metal Surfaces With the Electron Microscope. (In Italian.) W. Feitknecht and K. Huber. *Metallurgia Italiana,* v. 42, Feb. 1950, p. 53-57.

Methods for obtaining replicas of the etched metal surface to be observed with the electron microscope. The etch is always preceded by electropolishing. Many electron micrographs—chiefly corrosion figures—obtained on various metals with the electron microscope of the Institute of Inorganic Chemistry and Physics of the University of Berne. 10 ref. (M21)

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224-M. X-Rays Tell a Metal's Fortune. P. K. Kon. *Steel Horizons,* v. 12, Summer 1950, p. 10-11.

Elementary explanation of use of X-ray diffraction for structural analysis of metals. (M22)

225-M. Physics and Metallurgy. (In German.) G. Masing. *Metall,* v. 4, May 1950, p. 171-178.

Metallurgical phenomena, such as intermetallic crystals, solid solutions, plastic deformation, and mechanical damping, from the standpoint of physics (molecular and atomic structures). 17 ref. (M26, Q24, Q8)

226-M. Structure and Commercial Production of Corrosion Resistant Magnesium-Manganese Alloys. (In German.) A. Schneider and Henni Stobbe-Scholder. *Metall,* v. 4, May 1950, p. 178-183.

Characteristic features of the Mg-Mn constitution diagram and the mutual solubility of these two components at different temperatures; also different commercial methods of producing the Mg-rich alloys. Tests and experience have shown that presence of Fe greatly reduces the resistance of this alloy to corrosion. 22 ref.
(M24, E general, R general, Mg)

227-M. Determining the Constitution of Metal Systems in the Solid State by Measuring Their Electrical Resistances. (In German.) H. Vosskühler. *Metall,* v. 4, June 1950, p. 231-235.

The constitution diagrams of alloys can be established by determining either conductivity isotherms or temperature-resistance curves at room temperatures. Superiority over older methods is claimed. (M24)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

148-N. The Formation of Sigma Phase in 17 Per Cent Chromium Steel. J. J. Heger. *American Society for Testing Materials,* Preprint 53, 1950, 4 pages.

By using cold work and extended heating periods at 1050° F., sigma phase was formed and identified in 17% Cr (Type 430) stainless steel. (N8, SS)

149-N. Concerning the Transformation of Cobalt. (In French.) Max Sage. *Comptes Rendus* (France), v. 230, Apr. 3, 1950, p. 1354-1356.

A direct verification by means of X-ray diagrams of the mechanism of allotropic transformation of cobalt: slip of the (111) planes of the cubic phase which induces the formation of hexagonal phase with (001) planes. X-ray diagrams.
(N6, Co)

150-N. Equilibrium Diagram of the Order-Disorder Transformation in Ferronickels Having a Composition Close to Ni_3Fe. (In French.) Emile Josso. *Comptes Rendus* (France), v. 230, Apr. 17, 1950, p. 1467-1469.

Application of a differential dilatometric method for determination of the critical temperature of the above transformation. Equilibrium diagram shows that the transformation is plotted for Ni contents of 68-80%. (N10, M24, Ni)

151-N. Influence of Impurities on the Recrystallization of High-Purity Aluminum. (Concluded.) (In French.) H. Chossat. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 306-314; May 1950, p. 343-354.

April installment: Study of the recrystallization of 99.99% Al by isothermal annealing and a study of variations of hardness as a function of temperature of annealing and cold working. Final installment: Variation of mechanical properties as a function of grain size, and general conclusions of the study. Appendix on analytical methods for determination of Fe, Si, and Mg. 36 ref.
(N5, Q general, M27, S11, Al)

152-N. Mechanical Recovery of Aluminum Monocrystals. (In German.) Georg Masing and Josef Raffelsieper. *Zeitschrift fur Metallkunde,* v. 41, Mar. 1950, p. 65-70.

Because of Si content, commercially pure Al was found unsuitable for the study. Recovery of highly pure Al monocrystals was studied with the aid of the tensile test and at different temperatures. The activation energy of recovery decreases linearly with increasing internal stresses. 19 ref.
(N4, Q27, Al)

153-N. The Kinetics of Age Hardening. (In German.) Werner Köster. *Zeitschrift fur Metallkunde,* v. 41, Mar. 1950, p. 71-75.

Review of literature shows that age hardening is not, for all metals, a single sequence of structural changes, but may be the result of two different and independent atomic reactions. 30 ref. (N7)

154-N. The Problem of Orientation in Solid Solutions. (In German.) Iris Runge. *Annalen der Physik,* ser. 6, v. 7, Apr. 1, 1950, p. 129-146.

Computes by a statistical method the temperature at which the constituents of a binary system form superlattices, revealing new lines in the X-ray diagram. Shows that total energy and specific heat as a function of temperature can be determined from degree of orientation.
(N5, N10)

155-N. The Diffusion of Carbon in Sintered Alloy Steels. (In German.) W. Seith and H. Schmeken. *Zeitschrift fur anorganische Chemie,* v. 262, May 1950, p. 129-146.

The diffusion rates of carbon in steels containing Co, Cr, Cu, Mn, Ni, Si, V, and W at 1000-1200° C. were determined as well as effect of a third alloying component. Results are correlated with position in the periodic system, lattice constants, and heat of carbide formation. 28 ref. (N1, AY)

156-N. Formation of Round Crystals and Existence of Molybdenum Carbide, MoC. (In German.) W. Dawihl. *Zeitschrift fur anorganische Chemie,* v. 262, May 1950, p. 212-217.

Research confirmed the assumption that not only oxide or nitride impurities, but also disturbances of internal crystal structure may cause the formation of round crystals. MoC formed under the author's experimental conditions is unstable. Of greater stability is a solid solution of a carbide whose composition is approximately MoC+WC. 12 ref.
(N12, M26, Mo)

157-N. Influence of Boron on Kinetics of Austenite Transformation in Steel. (In Russian.) N. T. Gudtsov and T. N. Nazarova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 386-393.

Adding a boron alloy of complex composition (0.001-0.003% B) to medium-carbon Cr-Si-Mn steel during melting causes a decrease in the tendency toward grain growth of austenite, has practically no effect on position of the critical points during cooling, and markedly increases depth of heat treatment penetration in the case of normal annealing temperature and time.
(N8, ST)

158-N. Law of the Approach to Saturation for Martensite. (In Russian.) N. S. Akulov and K. M. Bol'shova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 1, 1950, p. 633-636.

Possibility of application of law developed by Akulov for the general case of polycrystalline ferromagnetics to nonequilibrium solid solutions containing marked local stresses and to heterogeneous alloys. The possibility was proven theoretically and experimentally for carbon steels containing 0.49, 0.75, 1.03, and 1.12% C, and differently heat treated.
(N8, CN)

159-N. ε-Phase of Nitrided Iron. (In Russian.) I. R. Krichevskii and N. E. Khazanova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 1, 1950, p. 677-680.

True conditions of equilibrium were determined for the system nitrogen—ε-Fe using the method of "combined equilibrium constants". Application of this method. Obtained data consisting of reaction and equilibrium constants, compositions, and molar volumes of γ and ε phases during their existence, and volatility of nitrogen between 400 and 600° C. (N8, M24, Fe)

160-N. The Diffusion of Carbon in Sintered Iron of Different Densities. (In German.) W. Seith and H. Schmeken. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, May 1950, p. 222-224.

Experiments show that the diffusion of carbon from carbonaceous into carbon-free sintered iron increases with the density of the latter and with temperature. (N1, H16, Fe)

P

PHYSICAL PROPERTIES AND TEST METHODS

186-P. The Maximum Range of High Energy Electrons in Aluminum and Copper. Frank L. Hereford and Charles P. Swann. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 727-731.

The above was measured in the region from 3 to 12 Mev. The magnetically analyzed beta-ray spectrum of B^{12} was employed, range values being determined from absorption curves obtained with a triple coincidence counter train.
(P15, Al, Cu)

187-P. Evaporation of Zinc and Zinc Oxide Under Electron Bombardment. Francis E. Dart. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 761-764.

By use of a mass-spectrographic method, rate of evaporation of Zn and ZnO was measured as a function of temperature both with and without electron bombardment of the surface being evaporated. In the case of Zn metal, no increase of evaporation could be detected, whereas a definite increase was observed in the evaporation of ZnO.
(P12, Zn)

188-P. A Theory of Secondary Electron Emission From Metals. E. M. Baroody. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 780-787.

Theory is formulated on the basis of the Sommerfeld free-electron model, momentum transfer between electrons and lattice being included by introducing a finite mean free path for elastic scattering. Explains

influence of work function and width of the conduction band showing why, on the average, metals with large work function are the best emitters. The observed effect of changing the work function of a given metal by surface layers of foreign atoms is interpreted. The theory also accounts for the velocity distribution of the secondaries. 14 ref. (P15)

189-P. Magnetic Field Penetration in Superconducting Lead. M. C. Steele. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 791-793.

The magnetic susceptibility of small superconducting lead spheres was determined by a self-inductance method. On the basis of relations derived from the London theory for reducing the data, the penetration depth is calculated for three different lead samples at 4.22° K. (P16, P15, Pb)

190-P. Superconductivity of Columbium. D. B. Cook, M. W. Zemansky, and H. A. Boorse. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 820-821.

Presents and discusses graphical data. (P15, Cb)

191-P. Correlation Between Electrical and Thermal Conductivity in Nickel and Nickel Alloys. Morris E. Fine. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 951-952.

Correlation of literature. Compares value for the ratio calculated by the electron theory of metals and experimental values for Cu and Ni alloys. 17 ref. (P15, P11, Ni)

192-P. Compilation of Body Wave Velocity Data for Cubic and Hexagonal Metals. Louis Gold. *Journal of Applied Physics,* v. 21, June 1950, p. 541-546.

Directional variation of sound wave velocities was computed where stiffness coefficients are known; the essential data are presented in the form of tables and graphs. Results for Al, Cu, Au, α-Fe, Pb, and Ag are tabulated in terms of directional indices. Compressional and shear velocities for Cd, Mg, and Zn are plotted as a function of angle formed by the direction of wave propagation and the hexagonal (c) axis from which are derived theoretical average velocities. (P10)

193-P. Work Functions of the Elements. Herbert B. Michaelson. *Journal of Applied Physics,* v. 21, June 1950, p. 536-540.

Like the chemical properties of the elements, work function is a periodic function of atomic number, as shown clearly by a new compilation of published data for 57 elements. The progressive rise and fall of work function values throughout the table of the elements appears to be sufficiently regular to permit approximations to be made of values for the metallic and semimetallic elements on which no data has yet been published. 149 ref. (P15)

194-P. Surface Roughness and Contact Angle. J. J. Bikerman. *Journal of Physical & Colloid Chemistry,* v. 54, May 1950, p. 653-658.

Contact angles were measured for distilled water in air on 18-8 stainless steel plates of different finishes. Relationship of surface roughness and contact angle. (P10, SS)

195-P. Calorimetric Method for the Determination of the Surface Energy of a Brittle Crystalline Solid. A. Kenneth Schellinger. *Science,* v. 111, June 23, 1950, p. 693-694.

The sample is contained in a suitably jacketed and instrumented chamber together with steel balls. The whole apparatus is rotated to crush the sample as in a ball mill. (P10)

196-P. Comparative Heat Losses From Bare and Anodized Aluminum Surfaces to Still Air. A. C. Burr and Robert H. Hay. *Canadian Journal of Research,* v. 28, sec. A, May 1950, p. 281-286.

Effect of anodic films on total heat losses to still air from the surfaces of cylindrical Al containers maintained at temperatures between 23 and 100° C. was studied by recording the power required to maintain the containers at various temperatures above ambient. (P11, Al)

197-P. The Cohesive Energy of Metallic Magnesium. S. Raimes. *Philosophical Magazine,* ser. 7, v. 41, June 1950, p. 568-582.

The method of Wigner and Seitz was applied to metallic Mg, using an ion-core field of the Hartree type. Two alternative self-consistent fields in the metal are considered. Wave functions and energies were found not to differ significantly in the two cases. Calculated values of lattice constant, cohesive energy, and compressibility were found to be in fair agreement with experiment. 15 ref. (P10, Mg)

198-P. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. *American Society for Testing Materials,* Preprint 10, 1950, 14 pages.

Includes proposed tentative test method for determining relative thermionic emissive properties of materials used in electron tubes, also detailed requirements and suggested processing procedure for standard diodes. (P15, S22, SG-q)

199-P. Preferred Domain Orientation in Permanent Magnet Alloys. M. McCaig. *Nature,* v. 165, June 17, 1950, p. 969.

Theories on the mechanism of the improvement of useful properties of "Alcomax II" achieved by cooling in a magnetic field. (P16, N5, SG-n)

200-P. Conductivity and Thermo-Electric Power of Selenium Single Crystals. K. W. Plessner. *Nature,* v. 165, June 17, 1950, p. 970-971.

Conductivity was studied as a function of applied field at −67 to 210° C. Thermo-electric power was also measured. Possible explanations for deviations from Ohm's law and other effects. (P15, Se)

201-P. Losses in Electrical Sheet Steel. K. H. Stewart. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 121-125; discussion, p. 126-131.

Experiments on magnetic losses in sheet steel at various power frequencies and flux densities and their interpretation. 17 ref. (P16, AY)

202-P. Some Metallurgical and Structural Factors Affecting Properties of Soft Magnetic Materials. W. F. Randall and H. H. Scholefield. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 133-140; discussion, p. 157-162.

The effect of metallurgical factors on magnetic properties is illustrated by reference to untreated and fully processed Ni-Fe and Si-Fe alloys. Factors considered are composition, major constituents and heterogeneity; purity or differences in ultimate composition; nonmetallic inclusions; strain content; structural orientation; grain size and grain shape; lattice ordering; magnetic domain orientation; and surface conditions and dimensional effects. Incidence and control in manufacture with particular reference to effect on magnetic properties. 27 ref. (P16, EG-p)

203-P. Laminated Ferromagnetic Cores at Very Low Inductions for Use in Line Communication. R. J. Halsey. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 141-157; discussion, p. 157-162.

Theoretical performance for homogeneous magnetic material at very low inductions compared with test results on typical specimens of materials and cores. Results for initial permeability and eddy-current losses of single-ring stampings, and effects of stacking. Corresponding measurements follow on single turns of typical strip and on spiral cores wound with strip down to 0.0006 in. thick. Extensive data on various ferromagnetic alloys. 31 ref. (P16, SG-n, p, Fe, Ni)

204-P. The Measurement and Calculation of Pulse Magnetization Characteristics of Nickel Irons From 0.1 to 5 Microseconds. W. S. Melville. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 165-198; discussion, p. 229-234.

Supplement to a previous paper by same author. Tests on Radiometal, Rhometal, and Mumetal in samples wound from rolled strip 0.001-0.010 in. thick. A theory of the mechanism of pulse magnetization; a method is derived for determining analytically the theoretical magnitude of eddy currents and losses for any form of pulse which can be represented by a finite number of linear voltage changes. (P16, Ni, Fe, SG-p)

205-P. The Incremental Magnetic Properties of Silicon-Iron Alloys With Particular Reference to the Design of Air-Gapped Smoothing Chokes. R. O. Carter and D. L. Richards. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 199-214; discussion, p. 229-234.

Fundamental considerations involved in defining the above properties, and methods of measuring them. Measured values for the various grades of hot rolled silicon-iron in common use. Purely analytical design method for air-gapped smoothing chokes. 32 ref. (P16, Fe)

206-P. The Use of a Miniature Lloyd-Fisher Square for Power-Loss Measurements at Audio Frequencies. O. I. Butler. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 215-220; discussion, p. 229-234.

Development of method for loss measurement on magnetic materials. Data for Si steels. 15 ref. (P16, AY)

207-P. Routine Testing Equipment for Transformer Steels. N. F. Astbury, T. Emmerson, and J. McFarlane. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 221-228; discussion, p. 229-234.

Application of an a.c.-d.c. null wattmeter method to routine work. The wattmeter circuit is incorporated with computing networks. (P15, AY, SG-p)

208-P. Some Properties and Tests of Magnetic Powders and Powder Cores. C. E. Richards, S. E. Buckley, P. R. Bardell, and A. C. Lynch. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 236-245; discussion, p. 267-272.

Powders of Fe or Fe-Ni alloys can be made either mechanically or chemically. The particles are then insulated and pressed into cores; high-permeability cores must be annealed after pressing. The permeability of the core depends mainly on the effectiveness of packing of the particles. Test methods and data for various materials, both commercial and experimental, including some ferrites. 19 ref. (P16, H10, Fe, Ni)

209-P. Resistivity of Pure Metals at Low Temperatures. I. The Alkali Metals. D. K. C. MacDonald and K. Mendelssohn. *Proceedings of the Royal Society,* ser. A, v. 202, June 22, 1950, p. 103-126.

Technique for measuring resist-

ance between 1.5 and 20° K. continuously. Resistivity was determined in this region, and results are discussed in comparison with theory. Resistivity of sodium was found to agree closely with theory, while in the case of the other metals the hypothesis of quasi-free conduction electrons does not seem to be fully justified. 30 ref. (P15, EG-e)

210-P. Graphic Method for Simultaneous Determination of Optical Constants and Thicknesses of Very Thin Metallic Films. (In French.) Damien Male. *Comptes Rendus* (France), v. 230, Apr. 3, 1950, p. 1349-1351.

Method based on measurement of factors of reflection and transmission of normal incidence. Data for a typical determination of gold and silver films. (P17, Au, Ag)

211-P. Antiferromagnetism and Intermittent Activation in Iron-Chromium and Iron-Vanadium Alloys. (In French.) Robert Forrer. *Comptes Rendus* (France) v. 230, May 3, 1950, p. 1584-1585.

(P16, Fe)

212-P. Certain Detector Properties Possessed by Thin Films of Silver. (In French.) André Blanc-Lapierre and Marcel Perrot. *Comptes Rendus* (France), v. 230, May 15, 1950, p. 1749-1751.

Detector properties of very thin films of silver subjected to strong electrical fields. These properties are related to the curve of current voltage. Influence of constant polarization voltage, alternating current, and frequency on the detector properties. (P15, Ag)

213-P. Current-Voltage Characteristics of Very Thin Silver Films for High Values of Electrical Field. (In French.) André Blanc-Lapierre and Marcel Perrot. *Comptes Rendus* (France), v. 230, May 8, 1950, p. 1641-1643.

A very important deviation from Ohm's law was observed at room temperature. This phenomenon is explained on the basis of theoretical considerations. Method of investigation. (P15, Ag)

214-P. Influence of Annealing on the Residual Magnetization of Ferromagnetics. (In French.) Jean-Claude Barbier. *Comptes Rendus* (France), v. 230, May 8, 1950, p. 1643-1645.

Investigations showed that annealing of magnetized substances causes a decrease of residual magnetization with increased temperature proportional to the square of the temperature changes. This phenomenon is in accord with the theory of L. Neel concerning the influence of thermal fluctuation on magnetization. (P16, J23, SG-n)

215-P. Electrical Properties of Thin Films of Germanium. (In French.) Jean-Michel Dunoyer. *Comptes Rendus* (France), v. 230, May 8, 1950, p. 1664-1665.

Investigations confirm the observations of Koenig indicating a considerable variation of coefficient of resistance during transformation from the crystalline state to the amorphous. A slight rectification effect was observed for the layers of evaporated Ge; this effect can be considerably amplified by using complex layers. (P15, Ge)

216-P. Theory of Magnetic Resistance Effects in Metals. (In German.) Max Kohler. *Annalen der Physik,* ser. 6, v. 6, Sept. 19, 1949, p. 18-38.

Critically reviews reported experiments on changes in the electrical resistance of metals in a magnetic field; and, on the basis of his own studies, concludes that, because of its complex mathematical character, theory is limited to a relatively few general statements which have been experimentally confirmed. 31 ref. (P16)

217-P. Heat Conduction of Metals in a Strong Magnetic Field. (In German.) Max Kohler. *Annalen der Physik,* ser. 6, v. 5, Nov. 26, 1949, p. 181-189.

Experimentation at low temperatures by Grüneisen and de Haas plus mathematical analysis shows that an extremely strong transverse magnetic field has a different effect on monovalent than on bivalent metals. 14 ref. (P16, P11)

218-P. Secondary Electron Emission of Metal Mixtures. (In German.) H. Salow. *Annalen der Physik,* ser. 6, v. 5, Jan. 16, 1950, p. 417-428.

The secondary-emission properties of binary metal mixtures are similar to those of molten alloys containing the same components. These mixtures, especially Cu-Mg, were found to be electrically and thermally stable and insensitive to CO_2-free foreign gases; films of such mixtures are well suited for secondary-emitting cathodes. 15 ref. (P11, P15)

219-P. Ferromagnetic Platinum-Manganese Alloys. (In German.) M. Auwärter and A. Kussmann. *Annalen der Physik,* ser. 6, v. 7, Apr. 1, 1950, p. 169-172.

Maximum magnetic saturation of the alloys containing 6-16% Mn was found to be 8000 gauss. Magnetizability, thermal expansion, lattice constants, and transformation temperatures of these alloys were also determined. (P16, P11, M26, Pt, Mn)

220-P. Magnetic Properties of Platinum-Iron Alloys. II. (In German.) A. Kussmann and G. Grafin v. Rittberg. *Annalen der Physik,* ser. 6, v. 7, Apr. 1, 1950, p. 173-181.

Intensity of saturation, determination of magnetothermal curves between −193° C. and the Curie point, hysteresis properties, and magnetostriction following different heat treatments for alloys containing 50-63% Pt. (P16, Pt, Fe)

221-P. Determining the Melting Point of Uranium. (In German.) Albert Allendörfer. *Zeitschrift für Naturforschung,* v. 5a, Apr. 1950, p. 234-235.

A thermo-electric method is presented. (P12, U)

222-P. Experimental Investigation of Surface Effects in Tubular Steel Sections. (In Russian.) L. R. Neiman and I. A. Zaitsev. *Elektrichestvo* (Electricity), Feb. 1950, p. 3-8.

Electrical properties. The problem of the distribution of inductive resistance on the interior and exterior for conductors of complex cross section was defined more accurately. Criteria were established for application of a simple calculation method to steel conductors of complex cross section. (P15, ST)

223-P. Distribution of Manganese and Phosphorus Between Molten Iron and Basic Slags. (In Russian.) V. A. Kozheurov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Mar. 1950, p. 233-243.

Results of a theoretical thermodynamic study. Formulas developed permit calculation of equilibrium constants of O_2, Mn, and P in the metal under basic slags of given composition. (P12, Fe)

224-P. Magnetostriction of Ni-Mn Alloys in Transverse and Longitudinal Fields. (In Russian.) D. I. Volkov and V. V. Zubov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 863-865.

Analyzes the theory of the even effects for magnetostriction phenomena, proposed by N. S. Akulov, and shows the validity of the second rule of this theory as applied to Ni-Mn alloys. Data are tabulated and charted for alloys containing up to 21.5% Mn. (P16, Ni)

225-P. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 27, June 1950, p. 495-500.

Eddy-loss problem and polyphase probabilities. (To be continued.) (P16, ST)

226-P. The Expansion Behavior of Enameled Cast Iron. (In German.) A. Dietzel and H. Lemme. *Sprechsaal für Keramik; Glas; Email,* v. 83, Jan. 5, 1950, p. 1-7; Jan. 20, 1950, p. 23-25.

Shows, on the basis of a literature search and experimental investigations, that cracks and other defects in enameled cast iron are not due to expansion of the iron. Specific ways of preventing such defects. Micrographs of five different cast irons in various stages of processing. 23 ref. (P11, L27, CI)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

426-Q. An Attempt To Find an Explanation and Working Theory of Cylinder Liner Wear, Compared With Practical Observations. H. Bergenheim. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 451-461. Reprinted from *British Motor Ship,* Dec. 1949.

Three processes occurring during combustion in an internal-combustion engine (electrochemical, oxidation, and detonation), and their results with respect to metallic wear and corrosion. Experimental work, shipboard observations, and results of diesel-oil examination. Conclusions are summarized. (Q9, R1, R2, T25, ST)

427-Q. Analysis of a Monocoque Aluminum Semi-Trailer. J. H. Dunn and R. L. Moore. *Automotive Industries,* v. 102, June 15, 1950, p. 42-43, 60, 62.

Correlation of design theory with actual stress measurements on loaded trailers. (Q25, T21, Al)

428-Q. Toughness of Titanium. R. K. Pitler and L. D. Jaffe. *Metal Progress,* v. 57, June 1950, p. 776-778.

Effect of temperature on impact strength of commercially pure Ti and one Ti alloy was studied. True stress-true strain tests were made on commercially pure Ti to investigate its strain hardening. (Q23, Ti)

429-Q. Binary Iron Alloys. *Metal Progress,* v. 57, June 1950, p. 802, 804, 806. Translated and condensed from "The Hardening and Softening of Binary Alloys of Iron", M. M. Shteinberg, *Stal* (Steel), v. 7, 1947, p. 1107-1110.

Purpose of study was to determine the influence of alloying elements dissolved in ferrite on its hardness, work hardening, and softening during heating. An induction furnace was used to melt a 44-lb. heat of each alloy, in which Armco iron was the base metal. (Q29, AY)

430-Q. Plasticity in Rolling. *Metal Progress,* v. 57, June 1950, p. 838-839. Translated and condensed from "Estimation of the Plasticity of Metals and Alloys Suitable for Hot Rolling or Forging", by Yu. M. Chizhikov, *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, 1949, p. 191-199.

Various methods, including the wedge-rolling method; attempts to show its superiority over other methods. The test is carried out on either cast or wrought specimens of square or rectangular cross section. The specimen is rolled in rolls of

constantly varying diameter so that reductions varying from 0 to more than 75% are obtained. Limit of plasticity is taken as the value of relative reduction of height. (Q23, F23)

431-Q. What Tensile Properties of Metals Mean in Design. John B. Campbell. *Materials & Methods,* v. 31, June 1950, p. 49-53.

Simple explanation of practical meaning of tensile properties, showing how they should be used in metals selection and design. (Q27)

432-Q. The Effect of Alloying Elements on the Plastic Properties of Aluminum Alloys. J. E. Dorn, P. Pietrokowsky, and T. E. Tietz. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 933-943.

Results of an extensive investigation of plastic properties of binary Al alloys in an attempt to clarify the general problem of solid-solution hardening. Tensile tests were conducted at 78, 116, and 194° K. following a standard recrystallization treatment for uniform grain size. Each specimen was examined by X-rays before and after tensile testing. Effects of grain size, test temperature, and alloying elements on true stress vs. true strain curves are shown graphically. Changes in lattice parameter corresponding to 1 at. % of alloying element were determined. Shows that Al contributes about 2 electrons per atom toward the metallic bond in its alloys. 24 ref. (Q23, N7, Al)

433-Q. The Properties of Some Magnesium-Lithium Alloys Containing Aluminum and Zinc. Robert S. Busk, Donald L. Leman, and John J. Casey. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, 945-951.

Mechanical properties and phase-temperature relationships. Shows that the strengths of some of these alloys can be tripled by heat treating and aging but that the high strength is accompanied by brittleness and lack of stability. (Q23, N7, Mg)

434-Q. A Quantized Theory of Strain Hardening as Applied to the Cutting of Metals. Milton C. Shaw. *Journal of Applied Physics,* v. 21, June 1950, p. 599-606.

Theory of strain hardening which utilizes the fact that metals deform blockwise rather than continuously. A metal is assumed to possess an orderly array of weak spots through which slip planes pass. The slip displacement which occurs upon a single plane is related to the spacing of weak points and the slip-plane inclination. Use of a linear relation between shear-plane displacement and resisting shear stress enables mean shear stress to be computed. Two examples are considered. (Q24)

435-Q. The Use of the Torsion Test. F. G. Tatnall. *Instruments,* v. 23, June 1950, p. 564, 566.

Advantages of torsion test under certain conditions other than in testing parts, such as axles and shafts. It tests materials in direct shear; it is a test for brittle materials, a sensitive test for surface corrosion, and has been used as an accelerated creep test. (Q1)

436-Q. Babcock & Wilcox Company Installs New Laboratory Equipment for Creep and Stress Rupture Studies. *Industrial Heating,* v. 17, June 1950, p. 988, 990, 992, 994. (Q3, Q4)

437-Q. Stress Analysis of Automotive Cylinder Blocks. Martin A. Erickson. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 2-10; joint discussion, p. 19-20.

Use of electrical-resistance type SR-4 gages in the determination of mechanical properties of cast iron. An example shows use of strain gages in the stress and strength analysis of an experimental automotive cylinder block. (Q25, T25, CI)

438-Q. Residual Stresses in Cylinder Blocks. R. J. King. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 11-15; joint discussion, p. 19-20.

Methods used on Diesel-engine cylinder blocks at Caterpillar Tractor Co. (Q25, T25, CI)

439-Q. An Analysis of Locked-In Stresses in Automotive Cylinder Blocks. S. J. Stockett and H. W. Lownie, Jr. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 16-18; joint discussion, p. 19-20.

Diagrams show method of attachment of three types of SR-4 gages. Where space permitted and the orientation of the stresses was not known, rectangular strain rosettes of the AR-1 type were used. Where orientation of the stresses could be predicted, single-element type A-1 gages were used. Single-element Type A-7 gages were used where the area of particular interest was too small to use Type A-1. Data are tabulated. (Q25, T25, CI)

440-Q. Strain Testing of Crankshafts, Engine Frames, and Cylinders. H. M. Hardy and T. O. Kuivinen. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type Gage"), p. 21-28.

Some examples of wire-resistance strain gage testing of cast iron machine parts to determine design weaknesses. Design modifications were made on cast crankshafts, engine frames, and compressor cylinders before such parts were placed in production. (Q25, T25, CI)

441-Q. Strain Gage Tests on Diesel Cylinder Blocks, Heads, and Pistons. C. L. Newton and J. D. Swannack. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950, ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 29-33.

Tests made on the cylinder block, piston, and cylinder head of a large diesel engine, to determine the approximate magnitude of stress in these parts under operating conditions. (Q25, T25, CI)

442-Q. Stress-Strain Tests on Rectangular Cast Iron Beams. Oliver Smalley. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 34-43; joint discussion, p. 50-52.

Tests were conducted on Types GM and GA Meehanite metal. Details of procedure and results. (Q25, CI)

443-Q. Stress-Strain Tests on Various Cast Iron Beam Sections. H. M. Hardy and T. O. Kuivinen. *American Society for Testing Materials.* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 44-49; joint discussion, p. 50-52.

Results of stress distribution tests on certain cast beams show why iron has a high modulus of rupture in bending, and serve to evaluate normal bending tneory in the fatigue range. (Q25, Q5, CI)

444-Q. Stress Analysis of a Cast Iron 125-lb. Valve Assembly. V. T. Malcolm and S. Low. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 53-59.

Test procedure and results obtained. (Q25, T7, CI)

445-Q. Stress Analysis of a Cast Iron Split Tapping Sleeve. E. C. Sears, J. W. Miner, and E. D. McCauley. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 60-64.

The SR-4 strain gage was used to determine the magnitude of the stresses produced in a cast-iron sleeve during assembly and while subjected to internal pressure. Object of the study was to reduce these stresses by proper changes in design. This fitting is used to cut into a 6-in. gas main for a 4-in. branch connection without interrupting service on the main. Four sleeves were tested, two of original design, a third incorporating two design changes, and a fourth having an additional design change. (Q25, CI)

446-Q. Stress Analysis of Cast Iron for Valve Parts. Harold Wyatt. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 65-67.

Technique using SR-4 strain gages. It involves obtaining a stress-strain curve to fracture and a complete set of stress-strain curves for different load levels within a working range. These curves are then used to evaluate the determined strains. (Q25, T7, CI)

447-Q. Residual Stresses in Cast Iron Deaerating Trays. J. A. Cameron. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 68-69.

Tensile stresses very closely approaching the tensile strength of the material were found in certain areas of the castings. As a result, subsequent production parts have been given a stress-relief heat treatment intended to reduce residual stresses and eliminate field difficulties. (Q25, J1, CI)

448-Q. Some Strain Gage Studies of Cast Iron Punch Press Frames. Given A. Brewer. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 70-72.

Strain-gage installation and application of results to redesign. (Q25, T5, CI)

449-Q. Stress Determination in Cast Irons for Railroad Service. R. A. Flinn and R. J. Ely. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 73-83; discussion, p. 84-85.

Indicates that shape and amount of graphite may normally change modulus of elasticity from 26×10^6 to 10×10^6 psi. Total elongation varies from 5.5 to 0.18% and tensile strength from 78,000 to 25,000 psi. Type of matrix may also affect the stress-strain curve. The measurement of strains during press fitting, and determination of residual stresses after different types of heat treatment. The apparent anomaly of tensile cracks in a quenched bore surface under residual com-

pressive stress is explored. Different cases of slow cooling, resulting in opposite residual stresses, are analyzed. (Q25, T23, CI)

450-Q. Location and Measurement of Stresses in Gray Iron Tractor Castings. H. Bornstein. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 86-89.

Use of brittle-lacquer and resistance-type gages. (Q25, T21, CI)

451-Q. Stress-Strain Studies of Cast Iron for Textile Machinery Parts. Victor E. Hillman. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 90-92.

Use of SR-4 gages. (Q25, T29, CI)

452-Q. Carrying Capacity of Simply Supported Mild Steel Beams. J. W. Roderick and I. H. Phillipps. "Engineering Structures" (Academic Press, New York, 1949), p. 9-47; discussion, p. 47-48.

Reviews investigations of plastic theory for mild steel. Concludes that, for the annealed or normalized condition, the version of Robertson and Cook represents most satisfactorily the behavior of a member subjected to pure bending. This is also borne out by tests on simply supported beams subjected to symmetrical two-point loadings. Tests under central concentrated loads, however, suggest that the stress concentration produced by the load may often be sufficient to modify considerably the bending-stress distribution assumed by Robertson and Cook. 54 ref. (Q23, Q5, CN)

453-Q. Performance of Laterally Loaded Channel Beams. G. Winter, W. Lansing, and R. B. McCalley. "Engineering Structures" (Academic Press, New York, 1949), p. 49-66, 68-92; discussion, p. 67.

In light-gage steel, construction members are produced by cold forming of sheet steel. Methods of determining the spacing and strength of bracing required to counteract the twisting tendency of such members. A general theory of elastic behavior of such members allows determination of stresses and rotations of channels loaded by forces in the plane of the web. Test information on ultimate carrying capacity as it is affected by location of braces. (Q21, CN)

454-Q. The Shortening Effect; A Non-Linear Feature of Pure Torsion. M. S. G. Cullimore. "Engineering Structures" (Academic Press, New York, 1949), p. 153-163; discussion, p. 163-164.

Two sets of experiments consisting, first, of measurements of longitudinal strains caused by pure torsion in Al alloy I and Z-sections, and second, of accurate determination of the torque-twist relationship of an Al alloy Z-section. Results of both experiments indicated that the extension of Weber's analysis to thin-walled structural sections was satisfactory. An attempt was made by the author to show a connection between shortening stresses and position of axis of twist in a bar under pure torsion. (Q1, Al)

455-Q. Investigations on Aluminum Alloy Riveted Joints Under Static Loading. A. J. Francis. "Engineering Structures" (Academic Press, New York, 1949), p. 187-215; discussion, p. 215-216.

Behavior of statically-loaded riveted joints of the type in which frictional effects are negligible. For joints under axial tensile load, a distribution method is given for determining theoretically the loads carried by the rivets in the elastic range. For eccentrically loaded joints, it is found theoretically that, in the elastic range, loads carried by the rivets differ considerably from those given by the conventional method. Experiments confirm the theory and also show that failing load of an eccentrically loaded joint may be appreciably greater than the conventional value. (Q21, Al)

456-Q. Review of the Testing of Structures. J. B. B. Owen. "Engineer-Structures" (Academic Press, New York, 1949), p. 241-258; discussion, p. 258.

Techniques for testing structures to destruction by applying slowly increasing loads are critically reviewed. Endurance testing; and the ease with which strain measurements can be made with pulsating-load machines in contrast to elaborate wiring systems associated with electric strain-gage techniques. 23 ref. (Q23, Q25)

457-Q. The Fatigue of Metals. R. C. Thurston. *Canadian Metals,* v. 13, June 1950, p. 8-11, 48-49.

Some of the factors which affect fatigue resistance of metal parts in service. The nature of fatigue; the S-N curve and its derivation; stress-raisers; machining and polishing; geometry of surface; shot peening; cold rolling; presetting or scragging; cyaniding, carburizing, and nitriding; and metallic surface coatings. 12 ref. (Q7)

458-Q. Ductility Testing of Aluminum-Alloy Sheets by Free-Cone Bend Test. W. Thompson. *Sheet Metal Industries,* v. 27, June 1950, p. 503-507, 512.

See abstract from *Metallurgia,* item 321-Q, 1950. (Q5, Al)

459-Q. Creep Testing by a Cantilever-Bending Method. G. T. Harris and H. C. Child. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 139-144.

Cantilever-bending creep testing is shown to have advantages over tensile testing for high temperatures and where the preparation of specimens must be reduced to a minimum, such as for unmachinable materials. There is good correlation between results obtained by this method and conventional testing at plastic strains up to 1.0%. Test data is for heat resisting steels. (Q3, SS)

460-Q. The Effect of Cold-Work on Steel. Introduction. J. H. Andrew and H. Lee. **Sec. I. Effect of Carbon on the Work-Hardening Properties of Steel.** J. H. Andrew, H. Lee, P. L. Chang, B. Fang, and R. Guenot. **Sec. II. Effect of Cold-Work Upon Electrical Resistivity in Steel.** J. H. Andrew, H. Lee, P. L. Chang, and R. Guenot. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 145-184.

Introduction: Various theories. Sec. I: Results of hardness, dilatation, density, and thermomagnetic measurements on cold drawn specimens of a series of plain carbon and alloy steels Results of X-ray and micrographic examination of cold drawn, high-carbon steel. Sec. II: Results of electrical resistivity measurements on cold drawn wires, both at room temperature and during or after subsequent heating. Effect of cementite distribution upon resistivity of steel after cold drawing. 29 ref. (To be concluded.) (Q23, P15, ST)

461-Q. Bars in Torsion—Methods for Analyzing Torsional Shear Stress. Walter W. Soroka. *Machine Design,* v. 22, July 1950, p. 120-124.

Techniques for study of torsional shear-stress distributions in uniform bars of arbitrary cross section. Numerical iteration procedure, electrical-resistance networks, electrically conducting sheets, membranes, the hydrodynamic simulator, and a three-dimensional photoelastic stress-freezing method. (Q1)

462-Q. Yield Conditions in Plane Plastic Stress. P. G. Hodge, Jr. *Journal of Mathematics and Physics,* v. 29, Apr. 1950, p. 38-48.

Mathematical analysis. 14 ref. (Q23)

463-Q. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials,* Preprint 8a, 1950, 4 pages.

Committee recommendations and diagrams for flat, unmachined and round, machined tensile-test bars for powdered metals. (Q general, H general, S22)

464-Q. Reproducibility of Results of Tension Tests on Specimens Prepared From Cast Steel Coupons. H. A. Schwartz and W. K. Bock. *American Society for Testing Materials,* Preprint 16, 1950, 9 pages.

Degree of reproducibility of the usual static tensile properties of grade "B" steel as determined on test coupons of several designs. Results of single tests or average of a small number of tests are shown to be inadequate for determining mechanical properties of a given steel cast in a given form of coupon. (Q27, CN)

465-Q. The Influence of Strain Rate on Some Tensile Properties of Steel. D. S. Clark and P. E. Duwez. *American Society for Testing Materials,* Preprint 17, 1950, 16 pages.

Inability of impact tests to reveal the true influence of strain rate on tensile properties is demonstrated. Fundamental requirements of a device by which strain-rate effects can be studied and details of apparatus constructed. Results of static and strain-rate tests for three different steels. (Q27, Q6, ST)

466-Q. Effects of Grinding and Other Finishing Processes on the Fatigue Strength of Hardened Steel. L. P. Tarasov and H. J. Grover. *American Society for Testing Materials,* Preprint 18, 1950, 20 pages.

Investigation of the fatigue strength of a ball-bearing type steel, similar to type 52100, at Rockwell hardnesses of C-45 and C-59. Endurance limits of round bars were affected relatively little by surfacing processes and the effects of a given process were not necessarily consistent for the two hardness levels. In no case did gentle grinding prove detrimental to fatigue properties. 14 ref. (Q7, G18, G19, AY)

467-Q. Rockwell C Hardness on Cylindrical Steel Specimens. Frank W. Hussey. *American Society for Testing Materials,* Preprint 20, 1950, 10 pages.

A series of more than 2800 individual hardness readings were made on the flat and curved surfaces of carefully prepared steel specimens of small diameter to determine deviations of hardness readings taken on curved surfaces from "true" values of flat areas. Resultant deviations, when plotted, indicate line relationships of such slight curvatures that straightline averages, obtained by the method of least squares, were utilized and considered sufficiently accurate for all practical purposes. Correlation curves are presented for obtaining actual Rockwell C hardness values from measurements on cylindrical surfaces of several diameters. (Q29, CN)

468-Q. Tensile Properties of Some Aircraft Structural Materials at Various Rates of Loading. Richard F. Klinger. *American Society for Testing Materials,* Preprint 25, 1950, 16 pages.

Effect of rate of loading in tension was determined at room temperature on nonmetallic and metal-

lic aircraft structural materials. Stress-strain curves and ultimate strength values, and rate of loading vs. strength relationships. Results indicate a pronounced increase of ultimate and yield strength values with increased rate of loading for several plastic materials. Bare 24S-T and 75S-T Al alloys showed little change in yield strengths with rate of loading. (Q27, T24, Al)

469-Q. A Method for Making Tension Tests of Metals Using a Miniature Specimen. R. L. Templin and W. C. Aber. *American Society for Testing Materials,* Preprint 28, 1950, 7 pages.

Apparatus and procedure using specimens 0.05 in. in diam. (Q27)

470-Q. Effects of Anodic Coatings on the Fatigue Strength of Aluminum Alloys. G. W. Stickley and F. M. Howell. *American Society for Testing Materials,* Preprint 32, 1950, 8 pages.

Fatigue tests on 17S, 25S, 75S, and B355. (Q7, L19, Al)

471-Q. Combined Tension-Torsion Creep-Time Relations for Aluminum Alloy 2S-O. Joseph Marin, J. H. Faupel, and L. W. Hu. *American Society for Testing Materials,* Preprint 33, 1950, 17 pages.

Investigation on the combined stress-creep properties of Alcoa 2S-O. Combined states of stress were produced by subjecting thin-walled tubular specimens of circular cross-section to various combinations of axial tension and torsion. Minimum constant creep rates for various values of the stresses and for ratios of the biaxial principal stress from 0 to −1.0 were found to be in approximate agreement with values predicted theoretically using simple tension-creep test results. (Q27, Q1, Q3, Al)

472-Q. The Effect of Various Treatments on the Fatigue Strength of Notched S-816 and Timken 16-25-6 Alloys at Elevated Temperatures. W. E. Jones. Jr. and G. B. Wilkes, Jr. *American Society for Testing Materials,* Preprint 35, 1950, 17 pages.

Various corrective treatments were tried, such as shot peening, coining, and heat treating, to improve notched strength. Ground notches tend to contain tensile stresses to a degree depending upon severity of grinding. Shot peening overcomes these stresses and introduces compressive stresses, improving fatigue strength. Several general conclusions are drawn regarding notches and treatments intended to reduce their damaging effect. (Q7, G23, Co, SG-h)

473-Q. Hardened Alloy Steel for Service up to 700 F. G. V. Smith, W. B. Seens, and E. J. Dulis. *American Society for Testing Materials,* Preprint 36, 1950, 11 pages.

Miscellaneous mechanical properties of two steels, SAE 4340 and 0.40% C Ni-Cr-Mo-V, quenched and tempered to a hardness of Rockwell C-43, then tested in tension at 75, 500, 600, and 700° F., in compression at 75° F., for creep-rupture strength at 500, 600, and 700° F., and for Charpy impact strength between 75 and 315° F. (Q general, AY)

474-Q. Hardening of Austenitic Stainless Steels by Mechanical Working at Sub-Zero Temperatures. N. A. Ziegler and P. H. Brace. *American Society for Testing Materials,* Preprint 39, 1950, 19 pages.

Deformation by shot peening, forging, rolling, and wiredrawing. Effect of temperature of plastic deformation, and of working and aging time and temperature. Tension, torsion, wear, and corrosion tests. (Q general, F22, F23, F28, G23, SS)

475-Q. Study of Deformation at High Strain Rates Using High-Speed Motion Pictures. Herbert I. Fusfeld and Josephine Carr Feder. *American Society for Testing Materials,* Preprint 42, 1950, 5 pages.

A shadow technique is used which permits measurements of strain and of neck shape throughout a tension test at high speeds. The method was applied to obtain curves of sharpness of the neck vs. strain, data similar to that used by P. W. Bridgman to correct stress-strain curves for true tensile stress once necking has set in. Materials tested were 24S-T and 75S-O Al, 70-30 cartridge brass, and cold rolled SAE 1020 steel. (Q27, Al, Cu, CN)

476-Q. The Influence of Specimen Dimension and Snape on the Results in Tension Impact Testing. D. S. Clark and D. S. Wood. *American Society for Testing Materials,* Preprint 43, 1950, 9 pages.

Data showing that it is necessary to maintain a ratio of specimen length to diameter of at least 13 in order clearly to reveal a critical impact velocity. Results of tests show that, for a constant cross-sectional area, shape of the cross section of the specimen does not alter tensile-impact characteristics. Tests were on SAE 1020 cold rolled steel, annealed steel, and annealed copper. 11 ref. (Q27, CN, Cu)

477-Q. Some Notes on the Structure and Impact Resistance of Columbium-Bearing 18-8 Steels After Exposure to Elevated Temperatures. W. O. Binder. *American Society for Testing Materials,* Preprint 44, 1950, 19 pages.

Influence of Cb on impact properties of 18-8 steels was studied in steels containing 8-16% Ni and 0-3% Cb. Addition of more than 2% Cb decreases toughness in the annealed condition due to formation of M_6C carbide and Fe_3Cb_2. Positive X-ray identification of sigma phase was obtained after long periods at 1200° F. for 8-16% Ni and 0.75-3% Cb. (Q6, M26, SS)

478-Q. Sigma Phase in Several Cast Austenitic Steels. V. T. Malcolm and S. Low. *American Society for Testing Materials,* Preprint 51, 1950, 7 pages.

Six materials commonly used for cast valves and fittings were investigated, three cast 18-8 alloys and three cast 16-35 alloys, with respect to embrittling effect of sigma phase after exposure to temperatures of 1000-1500° F. Embrittling effect was determined by means of keyhole-notch Charpy impact testing at both room and elevated temperatures. Identification of the sigma phase was made by means of metallographic and X-ray diffraction techniques. (Q6, M26, SS)

479-Q. The Effect of Environment on the Stress-Rupture Properties of Metals at Elevated Temperatures. O. Cutler Shepard and Willis Schalliol. *American Society for Testing Materials,* Preprint 58, 1950, 5 pages.

Stress-rupture tests in controlled atmospheres were made with low-carbon steels and with Hastelloy "C". Small differences in the composition of environment produced relatively large differences in the amount of intergranular cracking and in time to failure. (Q4, CN, Ni)

480-Q. Report of Committee E-1 on Methods of Testing. *American Society for Testing Materials,* Preprint 100, 1950, 31 pages.

Includes miscellaneous committee recommendations, tentative method of verification and classification of extensometers, and test for Brinell hardness of metallic materials. Effect of speed of testing on fatigue test results and the Mullen bursting strength test as a means of determining the strength of annealed aluminum foil. (Q general, Al)

481-Q. Report of Committee E-9 on Fatigue. *American Society for Testing Materials,* Preprint 107, 1950, 11 pages.

A survey of fatigue projects throughout the U. S. and Canada. Current projects at each company, university, or research institute are listed. Items on which information is needed. (Q7)

482-Q. Fatigue Strength of Cast Crankshafts. H. R. Mills and R. J. Love. *Institution of Mechanical Engineers, Proceedings* (Automobile Div.), part 3, 1948-49, p. 81-88; discussion, p. 88-99.

Results of a systematic investigation of effects of proportions of a cast crankshaft on its bending fatigue strength. A single-throw shaft 4½ in. diam. had its different dimensions varied one at a time over a range which covered the usual practical proportions. Tests on a geometrically similar shaft of 2¼ in. diam. were also included. Most of the conclusions apply equally to forged and cast crankshafts. Refers also to tests made on a number of different cast iron and cast steel crankshafts of the same design, to determine their merits as crankshaft materials. (Q7, T7, CI)

483-Q. Design and Construction of Equipment for a Small Stress-Rupture Creep Laboratory. F. C. Child. *Metallurgia,* v. 42, June 1950, p. 37-44.

Experience in the development of a creep testing laboratory for life-to-rupture tests on materials at 900° C. using miniature creep testing machines. Although designed for high-temperature testing, the apparatus has given satisfactory performance, with only minor alterations, at temperatures as low as 400° C. (Q3)

484-Q. Apparatus for the Measurement of Creep Under Fluctuating Stress. W. R. Tyldesley. *Metallurgia,* v. 42, June 1950, p. 45-48.

Stress system comprises a steady load on which is superimposed a smaller load fluctuating at the rate of 100 cycles per sec. 19 ref. (Q3)

485-Q. An Investigation Into the Relation of the Mechanical Properties of Ring Test Pieces to Those of Test Bars. E. R. Evans. *British Cast Iron Research Association Journal of Research and Development,* v. 3, June 1950, p. 421-440.

Properties of four types of cast iron as shown by ring-test pieces, bar-type test pieces machined from the same castings, and from separately cast test bars. Variation in properties of different parts of the same casting. (Q general, CI)

486-Q. A Few Short-Time, Growth and Creep Tests on an Unalloyed Pearlitic Grey Iron. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, June 1950, p. 441-445.

Results of three creep tests and a growth test at 500° C. and of short-time tensile tests at 400, 450, and 500° C. (Q3, Q27, CI)

487-Q. Remarks Concerning Particular Behavior of an Aluminum Grain During Mechanical Deformation. (In French.) Raymond Jacquesson, Paul Laurent, and Jack Manenc. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 61-64.

Influence of surface condition on the behavior of crystalline grains, during mechanical deformation of Al. Under favorable conditions, a slight irregularity of the surface may modify considerably the dislocation of the crystals. (Q24, Al)

488-Q. Contribution to the Study of the Stainless Ferrosilicons. (Concluded.) **III. Mechanical and Chemical Properties.** (In French.) Robert Lefé-

bure. *Métaux & Corrosion*, v. 25, Mar. 1950, p. 67-83.

Different methods for determining mechanical properties and corrosion resistance. Data for different compositions, and applications of the stainless ferrosilicons. 48 ref.
(Q general, R11, Fe-n, SS)

489-Q. Importance of Plasticity to the Phenomena of Metal Fracture. (In French.) O. L. Bihet. *Revue de la Soudure; Lastijdschrift*, v. 6, No. 1, 1950, p. 20-30.

Problem was thoroughly investigated with particular emphasis on theories of fracture, dislocation, mechanism of cold hardening, and its influence on the brittleness of metals. Selection of steels for welded structures. 17 ref.
(Q23, Q26, T26, ST)

490-Q. Research on the Relation Between Formability (Stamping Properties) **of Metals and Their Tensile Strength.** (In French.) Claude Arbel. *Revue de Métallurgie*, v. 47, May 1950, p. 388-394.

For 65-35 brass annealed at 540° C., 18-8 stainless, commercial copper, and 3S-O and 52S-O annealed Al alloys. Method of investigation. Different factors affecting the above relation such as anisotropy are thoroughly analyzed.
(Q23, Q27, Cu, Al, SS)

491-Q. Micrographic Study of Plastic Deformation of α-Brass; Application to the Surface Structure Caused by Abrasion. (In French.) P. A. Jacquet. *Revue de Métallurgie*, v. 47, May 1950, p. 355-364; discussion, p. 364.

Two methods are analyzed: a method based on the phenomenon of crystalline continuity and a method based on microhardness. The technique of investigation. 16 ref.
(Q23, Q29, Cu)

492-Q. Evaluation of Creep Tests. (In German.) Nikolaus Ludwig. *Zeitschrift fur Metallkunde*, v. 41, Mar. 1950, p. 87-91.

The designer can apply H. Eckardt's exponential law in order to estimate, on the basis of experimentally established creep-stress results, the expected expansions, exceptions being materials with a tendency to hot shortness. If the material is to be used at temperatures exceeding 600° C., the estimates must be based on long-time creep test results. 20 ref. (Q3)

493-Q. Slip Tendencies of Metallic Structures of the Magnesium Group. (In German.) H. Seifert. *Annalen der Physik*, ser. 6, v. 6, Sept. 19, 1949, p. 10-17.

The extent to which experimental slip behavior conforms to formal geometrical rules. Dynamics of the slip process is hypothetically related to the anisotropy of the electron density of the metal structure as determined by Fourier analysis. Kinematic details of mechanical twin formation in the Mg group. 13 ref. (Q24, Mg, Zn, Cd)

494-Q. A Mechanical Device for Measuring Small Changes in Linear Dimensions. (In German.) Günther Leibfried. *Zeitschrift für Physik*, v. 127, May 5, 1950, p. 580-587.

Device records the plastic deformation curves of metal wires with great accuracy. Several results obtained with Al monocrystals.
(Q23, S14, Al)

495-Q. Effect of Grain Size of Quartz Dust on Wear Resistance of Different Pairs of Materials. (In German.) Karl Wellinger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 92, May 21, 1950, p. 371-375.

Possible necessity of eliminating even the smallest dust particles from the air entering internal-combustion engines. Results show that rate of wear depends on the metal pairs present in cylinder and piston or piston ring, respectively; and that below particle sizes of 40μ, rate of wear drops rapidly with particle size. (Q9)

496-Q. Materialistic Principles in the Theory of Strength and Plasticity of Metals. (In Russian.) I. A. Oding. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 5-9.

Indicates the present-day trend in Russian metallurgical approach as being, not qualitative on the basis of fundamental investigations of test specimens, but toward quantitative investigation of mechanical properties of finished machine parts under service conditions. (Q23)

497-Q. Increasing Impact Strength. (In Russian.) G. I. Pogodin-Alekseev. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 17-20.

The problem of designing parts and structures for sharp impact stresses, with high capacity to absorb kinetic energy as well as high surface hardness, was investigated. Test specimens were all of the same cross-sectional area, and consisted of 1, 2, 3, or 4 sheets. A combination of hard and soft carbon steel sheets gives a strength close to the impact strength of single-sheet normalized test specimens and many times higher than that of cemented test specimens. Optimum combinations were determined. (Q6, CN)

498-Q. Fatigue Fracture of Machine Parts Operating Under Static Conditions. (In Russian.) M. M. Kobrin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 18-20.

Causes of fatigue failure of the main thrust screw (carbon steel) of a plastic extrusion press. Repeated alternating tensile and bending stresses are caused by operating conditions. (Q7, CN)

499-Q. The Problem of Hot Cracks in Steel Castings. (In Russian.) V. N. Saveiko. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 25-27.

Studied on cylindrical 0.3% C steel bars of different diameters. It was found that the safe compressive stress is almost completely independent of cross sectional area, and hot cracks are most liable where the cross-sectional area changes. (Q26, CI)

500-Q. New Method of Compression Testing. (In Russian.) K. K. Likharev. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 51-54.

Proposes, for testing of materials in the uniaxial, uniformly stressed state, use of hollow cylindrical test specimens whose ends are conical surfaces. The concentrations of local stresses encountered in conical solid specimens is thus eliminated. Tests of mild and red-hot steel, aluminum, silumin, brass, resins, and gypsum. Formulas for calculation of data. (Q28)

501-Q. Problems in the Theory of Plasticity. (In Russian.) S. I. Ratner. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 435-450.

Critical review and correlated discussion of recent literature (including non-Russian work). Tabular data for various common metals and alloys subjected to various heat treatments. 12 ref. (Q23)

502-Q. Relaxation of Austenitic Steel at Room Temperature. (In Russian.) I. A. Oding and E. N. Volosatova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 1, 1950, p. 659-662.

Investigated for an 18-8 austenitic steel and low-carbon α-iron. Relaxation was determined under initial stresses of 5, 10, 15, 20, 35, and 42 kg. per sq. mm. over a period of 1600 hr. Practical application indicated. (Q3, SS, Fe)

503-Q. Anisotropy of the Modulus of Elasticity of Ferromagnetic Monocrystals. (In Russian.) N. S. Akulov, I. P. Maxin, and Ya. I. Feld'shtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 851-854.

Theoretically investigates the possibility of application of the formula for natural anisotropy by including an additional term, describing the additional elongation induced by magnetic mechanostriction. Applicability of this formula is proven by theoretical considerations and experimental data. (Q21, SG-n)

504-Q. Contribution to the Theory of Relaxation Phenomena in Solids. (In Russian.) B. N. Finkel'shtein and N. S. Fastov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 875-878.

Attempts to formulate a new theory of relaxation on the basis of general thermodynamic consideration. Basic mathematical formulas of this theory are interpreted for different values of the variables. (Q3, P12)

505-Q. Criteria of Relaxation of Steels and Their Application. (In Russian.) I. A. Oding and V. Z. Tseitlin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 883-886.

Proposes charting of relaxation curves on semilogarithmic coordinates. This method establishes in simple form two important criteria: coefficient of intragranular resistance; and, intergranular relaxation stability of the metal. Method of application, particularly to the problem of thermal resistance of metals. Relaxation curves for three austenitic steels at room temperature.
(Q3, ST)

506-Q. Portable Unit Photographs Stress and Strain Curves. *Iron Age*, v. 166, July 13, 1950, p. 98.

Instrument manufactured by Baldwin Locomotive Works which may be used for load measurements, stress analysis, and function analysis during operation of equipment.
(Q25)

507-Q. Hot Hardness of Hard-Facing Alloys. Howard S. Avery. *Welding Journal*, v. 29, July 1950, p. 552-578.

Hot hardness was surveyed at 600, 800, 1000 and 1200° F. for a number of hard-facing alloys, using a Rockwell diamond-indentor technique. Some indication of creep resistance is obtained by incorporating a time factor in the test. Arc welds, gas welds, and castings of wear-resistant alloys are included in the survey. For a few materials creep and stress-rupture data are correlated with hot hardness. 39 ref.
(Q29, Q3, SG-m)

508-Q. Design Correlations for Cylindrical Pressure Vessels With Conical or Toriconical Heads. H. L. O'Brien, E. Wetterstrom, M. G. Dykhuizen, and R. G. Sturm. *Welding Journal*, v. 29, July 1950, p. 336s-342s.

Second part of an investigation of head-to-shell junctures of pressure vessels conducted at Purdue University. Material was ASTM A-201 fire-box-quality steel. Includes tests on commercially fabricated vessels designed to correspond in a 6:1 ratio with two of the 8-in. diam. models previously tested. Curves illustrate the comparison between measured and computed

stresses for 48-in. diam. vessels, along with conclusions. (Q25, K9, T26, AY)

509-Q. Effect of Grain Direction on Fatigue Properties of Aluminum Alloys. R. L. Templin, F. M. Howell, and E. C. Hartmann. *Product Engineering*, v. 21, July 1950, p. 126-130.

Since orientation of test specimens with respect to direction of working is known to have an effect on static mechanical properties, it it often assumed to have a similar effect on dynamic properties. Results of an intensive fatigue-testing program show this assumption to be erroneous for Al alloys. These results should influence design trends in highly stressed structures. 17 ref. (Q7, Al)

510-Q. Seven Causes of Railroad Diesel Engine Wear. *SAE Journal*, v. 58, July 1950, p. 18-21. Based on "Rates of Wear in Railroad Diesel Engines", by Ray McBrian and L. C. Atchison.

The seven main contributors to railroad diesel-engine wear are: Too high power output, excessive idling, low operating temperature, high-sulfur fuel, poor filtration, poor lube oil, and design shortcomings. Results of spectrographic analysis of lubricating-oil ash showing amount of metal pick-up for various conditions, which amount is directly related to wear. Metals determined were Cu, Sn, and Pb for bearings and thrust washers, Ag for wrist-pin bushings, and Fe for liner and ring wear. (Q9, T23)

511-Q. The Influence of Shape of Cross Section on the Flexural Fatigue Strength of Steel. T. J. Dolan, J. H. McClow, and W. J. Craig. *Transactions of the American Society of Mechanical Engineers*, v. 72, July 1950, p. 469-476; discussion, p. 476-477.

Above influence is not generally recognized. In order to obtain further information on its magnitude, flexural fatigue tests were made for four different shapes of cross section on two different steels. Results are compared and analyzed. Concludes that variations in residual stress or alterations of properties due to method of machining the different shapes play only a minor part in affecting relative endurance limits. Susceptibility to localized inelastic action governed by shape of cross section and by presence of "sore spots," such as outward projecting corners, are tentatively believed to be the primary elements leading to differences in flexural fatigue strengths. 12 ref. (Q7, ST)

512-Q. Allowable Eccentricity of Spherical Heads Convex to Pressure. R. G. Sturm, L. W. Smith, and H. L. O'Brien. *Transactions of the American Society of Mechanical Engineers*, v. 72, July 1950, p. 533-537; discussion, p. 538.

Variables and considerations in design of spherical heads or shells, initially out-of-round, when subjected to external pressure. A method of calculating charts for design purposes based upon the instantaneous modulus of elasticity. Calculations and charts for aluminum 3S-O, for 17-7 stainless steel, and for "A" nickel. (Q21, Al, SS, Ni)

513-Q. Analysis of Experimental Data Regarding Certain Design Features of Pressure Vessels. G. J. Schoessow and E. A. Brooks. *Transactions of the American Society of Mechanical Engineers*, v. 72, July 1950, p. 567-574; discussion, p. 574-577.

Analyzes data obtained by strain-gage experimental stress analysis on drum heads and nozzle openings in drum shells. The data are reduced to dimensionless form so that they may be applied to drums of other size and thickness but geometrically similar, and to illustrate more clearly the action of the drum in resisting pressure. Relationship between operating-stress level and service life. Effect of prestress created by overpressuring. (Q25, T26)

514-Q. Experimental Technique in Pressure-Vessel Testing. L. F. Kooistra and R. U. Blaser. *Transactions of the American Society of Mechanical Engineers*, v. 72, July 1950, p. 579-587; discussion, p. 587-589.

The latest designs of pressure vessels for high-pressure boiler service were investigated by means of experimental stress analysis and hydraulic fatigue tests. Metnods were developed to measure strain on the inside as well as on the outside of pressure vessels under internal pressure. Pulsating hydraulic fatigue tests were conducted on full-scale high-pressure drums. Scale-model vessels were similarly tested in a saturated-steam and water atmosphere of 2000 psi. (Q25, Q7, T26)

515-Q. Measuring Fringe Orders in Photoelasticity. W. A. P. Fisher. *Research*, v. 3, July 1950, p. 298-303.

Apparatus and procedures. 12 ref. (Q21)

516-Q. Damping Capacity. Part II. Effect of Conditions of Measurement. Edward Linacre. *Iron and Steel*, v. 23, June 1950, p. 285-288.

Continues descriptive review and correlation of the literature. 50 ref. (Q8)

517-Q. On the Inhomogeneity of Plastic Deformation in Metals. (In English.) W. Boas. *Helvetica Physica Acta*, v. 23, Feb. 3, 1950, p. 159-166.

Microscopic inhomogeneity of plastic deformation in metals and alloys due to crystal anisotropy and the presence of crystals of different structures. The importance of the inhomogeneity in relation to the theory of the deformation of crystal aggregates. Macroscopic inhomogeneity is produced by common methods of deformation. 11 ref. (Q24)

518-Q. Materials Testing and Strength Research in Germany in the Years 1939-1949. (In German.) E. Siebel. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 16, Apr. 1950, p. 97-114.

History of materials testing in Germany. Activities and advances of materials testing during the war and its revival after the war. Strength behavior under static and vibrating stresses. 30 ref. (Q general)

519-Q. Measuring Maximum Impact Force. (In German.) H. Mintrop. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 16, Apr. 1950, p. 119-124.

To test Hertz's theory and equations on the impact of solid elastic bodies, experiments were made in which polished metal spheres were dropped on different polished metal plates. Impact times were measured with the cathode-ray oscillograph and a slow-motion camera. 22 ref. (Q6)

520-Q. The Mechanical Properties of Titanium at Different Temperatures. (In German.) R. L. Bickerdike and D. A. Sutcliffe. *Metall*, v. 4, May 1950, p. 191-193.

Small amounts of O_2, N_2, and Si greatly increase the hardness and tensile strength of Ti without eliminating its ductility at room temperature. Elevated temperatures greatly decrease these properties. 16 ref. (Q23, Q29, Ti)

521-Q. Dimensional Considerations in Friction and Wear. C. Fayette Taylor. *American Society for Metals*, "Mechanical Wear", 1950, p. 1-7.

Lists symbols involved, defines certain technical terms, and gives some fundamental mathematical relations. (Q9)

522-Q. Wear in Diesel Engines. C. G. A. Rosen. *American Society for Metals*, "Mechanical Wear", 1950, p. 8-14; discussion, p. 14-16.

Factors affecting wear on cooperating surfaces—cylinder and piston ring, and crankshaft journal and bearing. Includes data on Rockwell hardness and wear rate for SAE 1045 steel. (Q9, T25, CN)

523-Q. Wear of Automotive Engine Cylinders and Piston Rings. Paul S. Lane. *American Society for Metals*, "Mechanical Wear", 1950, p. 17-43; discussion, p. 43-46.

Performance data, engine block design, and improvement in cylinder life, considering factors of metal structure, cleaning, precision boring, and surface finishing. Basic piston-ring design, improvement in rings through methods of fabrication, and causes and nature of wear. Materials are cast iron and carbon steel. 15 ref. (Q9, T21, CI, CN)

524-Q. Fuel and Lubrication Factors in Piston Ring and Cylinder Wear. A. G. Cattaneo and E. S. Starkman. *American Society for Metals*, "Mechanical Wear", 1950, p. 47-60; discussion, p. 60-72.

Testing technique and interpretation of wear data. Abrasive wear and corrosive wear particularly that resulting from sulfur and halides. 10 ref. (Q9, R1, T7, CN)

525-Q. Chemical Aspects of Wear and Friction. R. G. Larsen and G. L. Perry. *American Society for Metals*, "Mechanical Wear", 1950, p. 73-88; discussion, p. 88-94.

Oxidation of metal surface and of lubricant, physical adsorption of polar compounds, chemical vs. physical adsorption, competition of reactants for the surface, polymerization as a factor in lubrication, and orientation under shear. Data for mild steel, cast iron, and hard steel. 18 ref. (Q9, R2, CI, CN)

526-Q. The Vapor Lubrication of Graphite in Relation to Carbon Brush Wear. Robert H. Savage. *American Society for Metals*, "Mechanical Wear", 1950, p. 95-102; discussion, p. 102-108.

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plates and in the lubrication of carbon brushes. Structure of the brush face and the carbon film. (Q9, C)

527-Q. Wear and Damage of Metal Surfaces With Fluid Lubrication, no Lubrication and Boundary Lubrication. F. P. Bowden and D. Tabor. *American Society for Metals,* "Mechanical Wear", 1950, p. 109-129; discussion, p. 129-144.

Considers the effect of flat and curved surfaces. 29 ref. (Q9)

528-Q. Wear in Steam Turbines. Norman L. Mochel. *American Society for Metals,* "Mechanical Wear", 1950, p. 145-162; discussion, p. 162-164.

Mechanical wear between various solid surfaces of a small mechanical drive turbine. Correction procedure. (Q9, T25)

529-Q. The Need for Studies of "Real" Hydrodynamic Lubrication. R. W. Dayton. *American Society for Metals,* "Mechanical Wear", 1950, p. 165-177; discussion, p. 177-180.

Types of hydrodynamic lubrication. Pressure coefficient of viscosity, deflection of surfaces, surface roughness, hypothetical mechanism of failure, and limits of hydrodynamic lubrication. 15 ref. (Q9)

530-Q. The Dielectric Strength of Oil Film in Plain Bearings. C. M. Allen. *American Society for Metals,* "Mechanical Wear", 1950, p. 181-191; discussion, p. 191-197.

Method of estimating minimum oil-film thickness. Effect of foreign material, of bearing material on dielectric breakdown, of lubricant on bearing performance, and of load and speed on breakdown potential. Use of bearing material on shaft and ultimate load-carrying capacity. (Q9, SG-c)

531-Q. Gear Wear as Related to Viscosity of Oil. H. Blok. *American Society for Metals,* "Mechanical Wear", 1950, p. 199-217; discussion, p. 217-227.

Discussed in connection with impact loading. Considers the elimination of viscosity as a hydrodynamic factor in assessing antiwelding properties of gear oils. Test methods and results. 22 ref. (Q9, T7)

532-Q. Surface Deterioration of Gear Teeth. J. O. Almen. *American Society for Metals,* "Mechanical Wear", 1950, p. 229-267; discussion, p. 267-288.

Normal, abrasive, corrosive and "run-in" wear (leveling of local projections on teeth by plastic deformation and lapping). Effects of welding, empirical formulas for design, and computation of welding susceptibility. Lubrication of teeth, pitting fatigue, residual stress, and tooth interference. (Q9, T7)

533-Q. Recent Roll Tests on Endurance Limits of Materials. E. Buckingham and G. J. Talbourdet. *American Society for Metals,* "Mechanical Wear", 1950, p. 289-302; discussion, p. 302-307.

Endurance-test machine and results on carbon, alloy, and toolsteels. (Q7, CN, AY, TS)

534-Q. Hardness and Its Influence on Wear. Ragnar Holm. *American Society for Metals,* "Mechanical Wear", 1950, p. 309-321; discussion, p. 321-329.

The theory of contact hardness and principles for correlating frictional wear measurements. 21 ref. (Q9, Q29)

535-Q. Wear of Metals Against Smooth Refractory Materials. Lowell H. Milligan. *American Society for Metals,* "Mechanical Wear", 1950, p. 331-339.

Results of an investigation in Norton Co. research laboratories on surface plates used in the machine tool industry as a plane surface of reference for measurements. Blocks of hardened toolsteel and cast iron were used in the tests. (Q9, CI, TS)

536-Q. Friction and Wear of Some Powder Metallurgy Bronzes. John Dedrick and John Wulff. *American Society for Metals,* "Mechanical Wear", 1950, p. 341-353; discussion, p. 353-358.

Test procedure. Results for friction and wear of basic components, copper and alpha-bronze binary alloys, and complex bronzes. (Q9, Cu)

537-Q. Summary of Factors in the Wear Process. John T. Burwell, Jr. *American Society for Metals,* "Mechanical Wear", 1950, p. 359-369.

Primary operating conditions, intermediate factors, and manifestations of wear. (Q9)

538-Q. (Book) **Mechanical Wear.** John T. Burwell, Jr., editor. 387 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $6.50.

Includes 17 papers of a summer conference held June 1948 at M.I.T., which cover laboratory and service experience on wear and lubrication in internal combustion engines, steam turbines, brake materials, journal bearings, gears, electric brushes, surface plates, and cutting tools. Papers are abstracted separately. (Q9)

539-Q. (Book) **Engineering Structures.** 260 pages. 1949. Academic Press, Inc., 125 E. 234th St., New York 10. (Colston Papers, Vol II.)

Preface, introduction, list of members, and 15 papers presented at Symposium on Engineering Structutres, Sept. 1949 at University of Bristol under the auspices of the Colston Research Society. Papers deal with theoretical and experimental analysis of stress in structures. Some are applicable to specific metals and alloys; others to materials in general. Papers of the first type are abstracted separately. (Q25)

540-Q. (Book) **Stainless Steel Structural Design.** Michael Watter and R. A. Lincoln. 153 pages. Republic Press, Pittsburgh, $5.

Design procedure for calculating allowable loads for structures made of stainless steel. This procedure was developed and simplified by many applications at the Budd Company. Based on experience and testing at Allegheny Ludlum Steel Corp., it has proven very satisfactory. Data on physical properties of high-tensile, stainless steel strip, and practical engineering methods for determining the stresses in stainless steel structure elements, particularly behavior of columns. (From review in *Product Engineering.*) (Q25, SS)

541-Q. (Book) **Strength of Materials,** Ed. 5. James E. Boyd. (Revised by Samuel B. Folk.) 417 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $4.25.

In this revision, a conscious attempt is made to emphasize fundamentals of the theory and to accept the process of analysis in the application of mathematics to strength of materials. Assumes a knowledge of integral calculus and theoretical mechanics. (Q23)

542-Q. (Book) **Properties of Metals at Elevated Temperatures.** George V. Smith. 401 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18. (Metallurgy and Metallurgical Engineering Series.) $7.00.

A comprehensive summary of available knowledge on the effect of temperature on the properties of metals. Nature of plastic deformation and fracture of metals at ordinary and elevated temperatures. Effects of such variables as chemical composition, manufacturing practice, and heat treatment. Appendix describes the composition of "superalloys". (Q general, SG-h)

543-Q. (Book) **Symposium on Testing of Cast Iron With Sr-4 Type of Gage.** 92 pages. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3. (Special Technical Publication No. 97.) $1.65 (to A.S.T.M. members $1.25).

Introduction plus 15 papers and accompanying discussion presented at 52nd annual ASTM meeting, Atlantic City, N. J., June 29, 1949. Individual papers are abstracted separately. (Q25, CI)

544-Q. (Book) **Residual Stresses in Metals.** W. M. Baldwin, Jr. 45 pages, 1949. American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Edgar Marburg Lecture. Previously abstracted from *American Society for Testing Materials, Proceedings,* v. 49, 1949. See item 384-Q, 1950. (Q25)

R

CORROSION

234-R. Marine Boiler Deterioration. I. G. Slater and N. L. Parr. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 405-432. Reprinted from *Journal of the Institution of Mechanical Engineers,* Dec. 1949.

Surveys the several forms of boiler corrosion and deterioration encountered in marine practice. (R4, ST)

235-R. Corrosion Research in the Navy. Julius J. Harwood and Fred Schulman. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 463-485.

Previously abstracted from *Corrosion.* See item 6A-85, 1949. (R general, T22)

236-R. Cast 12% Chrome Steels Proved in Gas Wells. J. W. Juppenlatz. *Iron Age,* v. 165, June 22, 1950, p. 85-89.

Gas-well, Christmas-tree fittings made of cast 12% Cr alloy steel were found to be the ideal solution to severe corrosion encountered by the gas-condensate industry. Attack is by a mixture of organic acids plus carbonic acid. Conditions of high pressure, relatively high reservoir temperature, and turbulent flow causing erosion require an unusual combination of properties. Data for a variety of alloys, and typical corroded and eroded fittings. (R7, T28, SS)

237-R. Cathodic Protection Goes Offshore. E. P. Doremus and G. L. Doremus. *Oil and Gas Journal,* v. 49, June 22, 1950, p. 222, 225, 227-228.

Corrosion problems encountered on offshore oil-drilling rigs and platforms; also equipment for cathodic protection of steel in sea water. (R10, T28, ST)

238-R. Localized Formation of Magnetic Iron Oxide in Power Boilers. H. M. Rivers and W. M. Sonnett. *Combustion,* v. 21, June 1950, p. 41-46.

See abstract of "Steel, Heat and Water: Localized Formation of Magnetic Iron Oxide in Power Boilers," *Blast Furnace and Steel Plant,* item 231-R, 1950. (R4, CN)

239-R. Corrosion Mitigation Within Dehydrating Tanks. Ernest O. Kartinen. *Journal of Petroleum Technology,* v. 2, June 1950; *Transactions of*

the American Institute of Mining and Metallurgical Engineers, v. 189, 1950, p. 175-178.

Experiences with corrosion prevention in the water-exposed areas of dehydrating tanks, and in some stock tanks. Results with various coatings were unsatisfactory, but cathodic protection proved to be quite successful and economically feasible. Need for quantitative information concerning effects of various factors is indicated. (R10, T29, CN)

240-R. Field Test of a Cathodic Protection Installation. H. A. Sweet. *Journal, American Water Works Association,* v. 42, June 1950, p. 551-552.

Test results designed to evaluate a system for protection of a 75,000-gal. water tank. Unprotected specimens of mild steel corroded four to seven times as fast as the protected ones. (R10, CN)

241-R. Experience With Cathodic Protection. James W. McAmis. *Journal, American Water Works Association,* v. 42, June 1950, p. 553-554.

Experiences with cathodic protection of water-system standpipes over a period of years. (R10, CN)

242-R. Caustic Danger Zone. A. A. Berk and W. F. Waldeck. *Chemical Engineering,* v. 57, June 1950, p. 235-236, 238.

Test which locates temperatures and concentrations where caustic soda is liable to crack stressed steel. Results reported were obtained by C. K. Stoddard some 10 years ago during a cooperative study of the cracking of stressed steel in hot caustic solutions. (R5, ST)

243-R. Results of Galvanic Corrosion Tests Involving 9% and 5% Nickel Steel Tubing Coupled to N-80 Casing. *Corrosion* (News Section), v. 6, July 1950, p. 1. (R11, AY)

244-R. Water Side Deterioration of Diesel Engine Cylinder Liners. F. N. Speller and F. L. LaQue. *Corrosion* (Technical Section), v. 6, July 1950, p. 209-215.

See abstract of "Corrosion of Diesel Cylinder Liners", *Railway Mechanical and Electrical Engineer,* item 197-R, 1950. (R1, T25, ST, CI)

245-R. Cathodic Protection of Fourteen Offshore Drilling Platforms. E. P. Doremus and G. L. Doremus. *Corrosion* (Technical Section), v. 6, July 1950, p. 216-224.

See abstract of "Cathodic Protection Goes Offshore," *Oil and Gas Journal,* item 237-R, 1950. (R10, T28, ST)

246-R. Cathodic Protection of an Active Ship in Sea Water. K. N. Barnard and G. L. Christie. *Corrosion* (Technical Section), v. 6, July 1950, p. 232-234.

It is concluded that for a ship with an underwater area up to 10,000 sq. ft., a Mg protection system is practical and adequate. Costs are higher than those encountered where the anodes can be suspended at a distance from the steel being protected but still in the range where a saving would be realized over the life of a ship. (R10, T22, Mg)

247-R. New Controls for Tube-Film Deposit. *Power,* v. 94, July 1950, p. 98-101, 168, 170.

A black iron-oxide film is usually left on internal steel surfaces of boilers and tubing after acid cleaning. Experiments of effects of various materials and procedures for use after the normal acid-washing process. Nitrogen-displacement and water-displacement methods for reduction of deposit formation. Effects of various solutions on deposit formation and compositions of deposits. (R6, R4, ST)

248-R. Cures for Corrosion in Gas Condensate Wells. W. H. Stewart. *Petroleum Engineer,* v. 22, Reference Annual Issue, July 1950, p. B35, B38.

Recent work by various organizations including Battelle, U. S. Bureau of Mines, and University of Texas, sponsored by NGAA and NACE. (R7, ST)

249-R. Cathodic Protection on Texas Gas System. Robert J. Kuhn. *Petroleum Engineer,* v. 22, Reference Annual Issue, July 1950, p. D35-D36, D38-D40, D42, D44-D45.

Details of steps taken to prevent corrosion on the 840-mile line from Texas to Ohio. (R10, CN)

250-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, July 1950, p. 65A-66A.

Experiments which show that corrosion of plain low-carbon steel decreases and that of lead increases when wetting agents are added to dilute acid and basic solutions. (R5, CN, Pb)

251-R. Criteria for Cathodic Protection. *World Oil,* v. 131, July 1, 1950, p. 177-178.

Basic considerations in determination of proper protection for pipeline installations, and recommendations for proper protection through use of sacrificial anodes. The difference between costs with bare and protected or coated lines. (R10, ST)

252-R. A Bibliography on Cathodic Protection. F. A. Rohrman. *World Oil,* v. 131, July 1, 1950, p. 179-180, 132, 184, 186, 188, 190.

Lists 436 references by year of publication. Each is classified into one of five categories. (R10)

253-R. Report of Corrosion Committee. Sidney E. Trouard, chairman. *American Gas Association, Proceedings,* v. 31, 1949, p. 487-496.

Reports of subcommittees on causes of underground corrosion of metals, underground corrosion mitigation practices, instrumentation, and above-ground corrosion mitigation practice. Also includes paper, "Your Corrosion Problems Can't Be Solved on a Hit or Miss Basis", Pat H. Miller. (R general, R10)

254-R. Practical Cathodic Protection for Gas Distribution Systems. A. D. Simpson, Jr. *American Gas Association, Proceedings,* v. 31, 1949, p. 641-668.

Magnitude of corrosion leak experience on the Houston, Texas, system and their experience with cathodic protection for steel mains. Method of application and results obtained. (R10, CN)

255-R. Rectifiers and Galvanic Anodes for Cathodic Protection. A. L. Stegner. *American Gas Association, Proceedings,* v. 31, 1949, p. 669-673.

Advantages and disadvantages of each, based on generalities and experiences of engineers in the field. (R10, CN)

256-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials,* Preprint 3, 1950, 29 pages.

Includes miscellaneous committee recommendations; subcommittee reports on total immersion tests, on atmospheric exposure of black and galvanized sheets, wire and wire products, bare and metallic coated hardware, structural shapes, plates, bars, etc. Proposed revised tentative specifications for Zn-coated iron or steel sheets, coils, and cut lengths; also long terne iron or steel sheets, coils, and cut lengths. (R general, S22, Fe, ST)

257-R. Report of Committee B-6 on Die-Cast Metals and Alloys. *American Society for Testing Materials,* Preprint 12, 1950, 6 pages.

Includes extensive table of mechanical property data on Mg and Zn base alloys after 10 years atmospheric exposure at various locations. (R3, Q general, Mg, Zn)

258-R. Spray Testing With Natural and Synthetic Sea Water. Part II. A Study of Organic Coatings. Allen L. Alexander and Thomas P. May. *American Society for Testing Materials,* Preprint 26, 1950, 6 pages.

Simulated sea water is justified as a test medium in lieu of genuine sea water for use in salt-spray testing. Results in the evaluation of organic coatings applied to ferrous surfaces. (R11, L26, Fe)

259-R. Coal-Ash Corrosion of Metals at Elevated Temperatures. C. T. Evans, Jr. *American Society for Testing Materials,* Preprint 55, 1950, 6 pages.

Cooperative study with Locomotive Development Committee of Bituminous Coal Research Assn. and Crucible Steel Co. of America on S-588 heat resisting alloy at 1350° F. Several other metals were also tested in the unstressed condition at 1000, 1350, and 1500° F. in contact with representative Ohio coal ash. Compares results with those obtained at Battelle Memorial Institute. (R7, AY, SG-h)

260-R. Stress-Corrosion Tests on Turbo-Supercharger Materials in the Products of Combustion of Leaded Gasoline. G. B. Wilkes, Jr. *American Society for Testing Materials,* Preprint 60, 1950, 13 pages.

Tests were made on 18 high-temperature alloys under both constant and cyclic temperature conditions. Acceleration of strain due to temperature cycling alone has a greater detrimental effect on strength. Speculations concerning the mechanism of stress-corrosion. (R1, SG-h)

261-R. Stress-Corrosion of Aluminium-7% Magnesium Alloy. E. C. W. Perryman and S. E. Hadden. *Journal of the Institute of Metals,* v. 77, May 1950, p. 207-235.

Determined after various aging treatments. Shows that there is close correlation between continuity of the grain-boundary β precipitate and the stress-corrosion susceptibility when sprayed with 3% NaCl solution, maximum susceptibility occurring when this precipitate is apparently quite continuous. Cold work before aging increases rate of precipitation and has a profound effect on stress-corrosion susceptibility. Internal strains set up during precipitation are shown to play no important part in the stress-corrosion mechanism. Small additions of Zn decrease rate of precipitation; however, they have little or no influence on stress-corrosion susceptibility. 26 ref. (R1, Al)

262-R. A Theory of the Mechanism of Stress-Corrosion in Aluminium-7% Magnesium Alloy. P. T. Gilbert and S. E. Hadden. *Journal of the Institute of Metals,* v. 77, May 1950, p. 237-261.

Theory based on experimental data postulates that, in stressed specimens, stress concentrations are built up at the tip of crevices formed by preferential attack of the β (Al_3Mg_2) phase. When the stress concentration at the tip of the most advanced crevice is sufficiently high, a sudden partial mechanical fracture between β and the solid solution leads to progress of the crack along the grain boundary. Rapid corrosion of the surfaces so exposed then occurs, with evolution of hydrogen. This intercrystalline attack quickly slows down as corrosion films reform on the electrodes and then proceeds by oxygen absorption. Eventually conditions leading to mechanical disruption are again built up. 15 ref. (R1, Al)

263-R. Relationship Between The Aging and Stress-Corrosion Properties of Aluminium-Zinc Alloys. E. C. W. Perryman and J. C. Blade. *Journal of the Institute of Metals,* v. 77, May 1950, p. 263-286.

Changes in microstructure which take place on aging an Al+10% Zn alloy at room temperature and at temperatures up to 125° C., correlated with stress-corrosion properties. Alloys containing 8 and 13% Zn were also examined. 21 ref. (R1, N7, Al)

264-R. Sulphur in Diesel Fuels. J. J. Broeze and A. Wilson. *Institution of Mechanical Engineers, Proceedings* (Automobile Div.), part 3, 1948-49, p. 128-136; discussion, p. 136-145.

Relevant physicochemical reactions of sulfur in the engine focus attention on the trioxide produced during combustion as the principal cause of ill effects. Among precautionary measures, certain beneficial rules of engine operation and design are proposed. Importance of metallurgical expedients such as chromium plating, and of use of special additive-type lubricants. 14 ref. (R7, Cr, CI)

265-R. Durability of Aluminium and Its Alloys. *Light Metals,* v. 13, Apr. 1950, p. 195-203; June 1950, p. 344-349.

Corrosion resistance and applications of Al as contrasted with those of the heavy metals. Part Two reviews the corrosion resistance of the various composition groups. (R general, Al)

266-R. Resistance to Caustic Soda of Different Materials. (In French.) A. Guitton. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 84-86.

Corrosion resistances of alloy steels with a high content of Ni and Mo, Worthite, lead, enameled steel, rubber coatings, ferrosilicon, stainless steels, and cement. (R5, SG-g)

267-R. Tropicalization of Certain Materials and Parts Used in Construction of Electronic Tubes. (In French.) Georges Trebuchon. *Vide,* v. 5, Jan. 1950, p. 748-752; Mar. 1950, p. 777-780; May 1950, p. 814-818.

The "tropicalization"—increase in resistance to hot and humid conditions found in the tropics—of various metals, ceramics, and glasses. Results are presented in outline form. Jan. issue: The problem, and the status of present-day specifications. Mar. issue: Test procedures. May issue: Methods for protection of the various materials from conditions encountered in the tropics. Various types of coatings. 10 ref. (R3, L general, T1)

268-R. Research on Oxidation of Iron-Nickel Alloys at High Temperatures. (In French.) J. Bénard and J. Moreau. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 317-323; discussion, p. 323.

A short resume of results of study on Fe-Ni alloys containing 5, 10, 20, and 30% Ni, and covering surface oxidation, internal oxidation, and kinetics of the oxidation. Research methods and apparatus. (R2, Fe)

269-R. Radiographic Proof of the Direct Oxidation of Platinum. (In German.) Rudolfo H. Busch. *Zeitschrift fur Naturforschung,* v. 5b, Apr.-May 1950, p. 130-132.

Slow formation of PtO_2 and Pt_3O_4 under different conditions. 16 ref. (R2, Pt)

270-R. Surface Layers on Magnesium. (In German.) F. Sauerwald. *Zeitschrift fur anorganische Chemie,* v. 262, May 1950, p. 69-78.

Magnesium alloys were anodized in salt baths and in aqueous solutions of the same salts in order to study the corrosion properties of the resulting surface films. (R general, L19, Mg)

271-R. The Scaling Behavior and the Mechanism of Oxidation of Heat and Scale Resistant Hard Alloys, Especially Those Based on Titanium Carbide. (In German.) R. Kieffer and F. Kölbl. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 229-247.

Reviews the literature and presents graphs, tables, photographs, and diagrams, showing properties of various hard metals and carbide alloys. 30 ref. (R2, Ti, W, C)

272-R. Nephelometric Testing. (In Italian.) G. Petracchi. *Metallurgia Italiana,* v. 42, Feb. 1950, p. 58-59.

Phenomenon of appearance of turbidity when ferrous materials are immersed in a clear liquid. Results of some experiments which indicate that degree of turbidity is an indicator of corrosion resistance, also of corrodibility vs. variation of internal energy due to magnetization and mechanical stressing. (R11, Fe)

273-R. Oxidation of Cobalt at High Temperatures. (In French.) Gabriel Valensi. *Metallurgia Italiana,* v. 42, Mar. 1950, p. 77-84.

Theoretical analysis of the problem is supplemented by a critical correlation of literature data and a description of some experimental work. While freshly exposed cobalt does not follow the Pilling and Bedworth ordinary law under 900° C., but a more complicated one; cobalt exposed to air, becoming covered by an invisible film, has a high-temperature oxidation rate which complies with the ordinary parabolic law. This same law is followed over 900° C., but there are two activation energies. (R2, Co)

274-R. The Effect of Oxygen in Gas Upon Gas Distribution Systems. Frank P. Mueller. *American Gas Association, Proceedings,* v. 31, 1949, p. 730-737.

Recent trends in gas production, natural gas-air mixtures, oxygen content of the latter and of liquefied petroleum gas-air mixtures, and corrosion of transmission lines. Results of questionnaire. 18 ref. (R9, T4, CN)

275-R. Corrosion Testing. R. N. Ride. *Plating Notes,* v. 2, Apr. 1950, p. 44-65.

Corrosion and corrosion resistance, the electrochemical theory of corrosion, general principles of corrosion testing, and various types of corrosion tests. Some new types of test equipment. 15 ref. (R11)

276-R. Sulfur in Your Crude Oil? It's Not How Much But Where. William C. Uhl. *Petroleum Processing,* v. 5, July 1950, p. 729.

Refinery corrosion from sweet crudes found to be caused by high sulfur content of light fractions. Greater use of alloy steels was found to be necessary. (R7, T28, AY)

277-R. Accelerated-Cavitation Research. W. J. Rheingans. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 705-719; discussion, p. 719-724.

Cavitation-pitting tests were made with an accelerated-cavitation machine of the vibratory type. An attempt was made to solve some of the phenomena of cavitation by varying amplitude of vibration, depth of submergence of the test specimen, and by using alkalies, acids, and oils for the test liquid. Other tests were made to determine relative resistance to pitting of recently developed materials. Miscellaneous ferrous and nonferrous metals and alloys, sprayed metals, also nonmetallic materials were tested. 12 ref. (R2)

278-R. From a Metallurgist's Notebook: Corroded Bronze. H. H. Symonds. *Metal Industry,* v. 76, June 30, 1950, p. 505-506.

During a relatively short period of service, considerable attack took place on the retaining strip in a thermostat compensating assembly. Investigation showed that the assemblies had come into contact with gases which were much too corrosive for the particular material. (R9, Cu)

279-R. The Effect of Dilute Sulfuric Acid on Magnetized Iron. I. (In German.) Georg Wagner. *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Osterreichs,* v. 4, May 1950, p. 29-31.

F. Ehrenhaft's "magnetolysis" in which magnetized iron dissolved in dilute H_2SO_4 forms O_2 as well as H_2 was studied. Results confirm Ehrenhaft's findings that the evolved hydrogen actually contains about 0.40% O_2. 13 ref. (R5, Fe)

280-R. Stress Corrosion Cracking of Stainless Steels. I. Practical Experiences. II. An Investigation of the Suitability of the U-Bend Specimen. (In Swedish.) Helmer Nathorst. *Jernkontorets Annaler,* v. 134, No. 3, 1950, p. 97-133.

Part I: Summary of service failures reported in Sweden, divided into three groups on the basis of corrosing liquid; the first containing chlorides, the second alkalies, and the third miscellaneous agents. Among the latter are sodium hypochlorite, o-dichlorobenzene, and pine resin. Part II: Reproducibility of U-bend tests using 1.5-mm. specimens of 18-8 sheet immersed in hot concentrated $CaCl_2$ solutions. Fairly good reproducibility can be achieved if certain precautions are followed. Drawbacks of the test. 33 ref. (R1, SS)

281-R. Stress Corrosion of Brass. (In Dutch.) W. G. R. de Jager. *Metalen,* v. 4, Mar. 1950, p. 138-148; May 1950, p. 185-190.

Surveys current literature on the stress-corrosion cracking (season cracking) of brass. Standardization of an accelerated ammonia test to control susceptibility to this type of cracking of brass is recommended. May issue: Stress-corrosion resistance of brasses containing various amounts of Zn, P, As, Sb, Si, Ni, and Al. 30 ref. (R1, Cu)

S

INSPECTION AND CONTROL

252-S. Willys Simplifies Forging Inspection. George H. Fromer. *Iron Age,* v. 165, June 22, 1950, p. 95-97.

Conveyerized magnetic-particle inspection machine which checks 600 parts per man-hr. as compared with 188 for the old method. Inspection quality is raised. Labor costs are cut 70%. (S13, ST)

253-S. Exposures for Radium Radiography of Steel. A. Morrison. *Metal Progress,* v. 57, June 1950, p. 780B.

From the accompanying graphs, exposure time required for radium radiography of steel for several popular types of film can be obtained. The graphs are a revision of data originally presented in *ASTM Bulletin,* Mar. 1944. (S13, ST)

254-S. Measurement of Surface Roughness. E. Green. *Organic Finishing,* v. 11, June 1950, p. 8-12.

Methods of assessing surface roughness and the application of the stylus instrument to the measurement of painted surfaces. (S15)

255-S. Watch Your Surface Finish. Part II. *Steel,* v. 126, June 26, 1950, p. 78-79, 90.

Development of geometric surface-

finish standards in General Motors and Chrysler research laboratories to assist surface-finish control in many manufacturing operations. (S15)

256-S. Quality Control of Aluminum Alloy Castings. Richard R. Senz. *Foundry,* v. 78, July 1950, p. 64-67, 208-210.

Effects of design and of foundry practices. Inspection methods for controlling quality, and the role of statistical analysis. (S12, E general, Al)

257-S. Practical Butt Weld Inspection Using Ultrasonic Flaw Detection. A. C. Rankin. *Welding,* v. 18, May 1950, p. 199-209; June 1950, p. 243-247.

Recommended angular positions of the ultrasonic beam with respect to the welds. Typical macrographs and flaw traces. (S13, K9)

258-S. From a Metallurgist's Notebook: Broken Pressure Vessel. H. H. Symonds. *Metal Industry,* v. 76, June 9, 1950, p. 457-458.

Investigation of the cause of failure of a brass pressure vessel. No confirmation was found for the alleged cause of failure—faulty soldered joint or inferior brass. (S21, T26, Cu)

259-S. Testing and Inspection of Tool Steels. L. Sanderson. *Machinery Lloyd* (Overseas Edition), v. 22, June 10, 1950, p. 75-79, 81, 83.

Simple test procedures. Diagrams show types of sparks emitted by various ferrous alloys on bringing into contact with an abrasive wheel. (S10, TS)

260-S. Determination of Tin in Highly Alloyed Steels. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 190-197.

The method described depends upon solution of the steel in non-oxidizing acid, separation and removal of unattacked complex alloy carbides, followed by precipitation of tin as sulfide, together with molybdenum sulfide as a "gathering" agent. The filtered sulfide precipitate is dissolved in mineral acid, and after adding iron, the hydroxides of Sn and Fe are simultaneously precipitated with ammonia. (S11, Sn, AY)

261-S. The Radiography of Heavy Metals. R Jackson. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 96-114.

Details of recommended methods. (S13, EG-h)

262-S. The Radiography of Light Metals. W. L. Harper. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 115-129.

Details of recommended methods. (S13, Al, Mg)

263-S. Gamma Radiography. C. Croxson. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 130-161.

Recommended procedures. 16 ref. (S13)

264-S. Some Uncommon Applications of Industrial Radiography. L. Mullins. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 162-194.

A variety of applications, many of them with metal assemblies or connected metallurgical tests. 237 ref. (S13)

265-S. 18-8 Stainless Now Easily Classified. O. J. Winkle. *Iron Age,* v. 165, June 29, 1950, p. 80-81.

Douglas Aircraft precipitation-pickle process which allows rapid and positive identification of stabilized and nonstabilized forms of 18-8. Photomicrographs and macrographs show comparative appearances. (S10, SS)

266-S. Inspection and Testing of Welded Piping. *Heating Piping & Air Conditioning,* v. 22, July 1950, p. 110-112.

Preliminary inspection, visual inspection of work in progress, nondestructive tests of various kinds, destructive tests of selected joints, hydrostatic tests, and service tests. (S13, K9)

267-S. Designing Inspection Fixtures and Tools. W. H. Barling. *Tool Engineer,* v. 25, July 1950, p. 39-40.

Basic principles. (S general)

268-S. Nondestructive Testing of Drill Pipe. Norman Bowers. *World Oil,* v. 131, July 1, 1950, p. 87-90, 92.

Available methods and limitations of those that might be used for the inspection of new and used drill pipe. (S13, T28, ST)

269-S. Why Machine Parts Fail. Part 3. Modes of Failure. Charles Lipson. *Machine Design,* v. 22, July 1950, p. 141-145.

Analyzes reasons for various types of failure. Two basic mechanisms are ductile or shear, and brittle or normal. Seven external and two internal factors affecting mode of failure. Relationships of various factors. Typical failures. (S21, Q general)

270-S. A Metallurgical Evaluation of SAE Tool Steels. A. S. Jameson. *Iron Age,* v. 166, July 6, 1950, p. 85-87.

Evaluation is based on arbitrary ratings which are relative between or among types of steels. Selection of a particular analysis by physical properties in each group. Shown in tabular and graphical form under six basic categories, including elementary compositions and indices of merit. (S22, Q general, TS)

271-S. Radiographing and Controlled Low-Temperature Stress-Relieving of Welded Tanks for Wet Seal Gas Holder. Rudolf Kraus. *American Gas Association, Proceedings,* v. 31, 1949, p. 842-852.

Residual welding stresses in thick plate using 2-in. plates of ASTM A-70 steel. As-welded stresses, low-temperature stress-relieving, and stresses at the weld, as well as welding a 10,000,000 cu. ft. holder, radiographing, and stress-relieving in the field. (S13, J1, K general, AY)

272-S. Report of Committee A-1 on Steel. *American Society for Testing Materials,* Preprint 1, 1950, 36 pages.

Besides miscellaneous committee recommendations, report includes tentative specifications for sheet piling and heat treated steel tires and tentative methods and definitions for mechanical testing of steel bars. (S22, Q general, ST)

273-S. Report of Committee A-9 on Ferro-Alloys. *American Society for Testing Materials,* Preprint 5, 1950, 6 pages.

Includes recommendations affecting standards on ferro-alloys. (S22, Fe-n)

274-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 11, 1950, 8 pages.

Miscellaneous recommendations concerning test methods, specifications, and standards. (S22, Cu)

275-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 13, 1950, 12 pages.

Includes recommendations affecting standards for cast and wrought Al and Mg-base alloys also proposed tentative specifications for Al alloy die forgings. (S22, Al, Mg)

276-S. Report of Committee E-3 on Chemical Analysis of Metals. *Amer-*

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ican Society for Testing Materials, Preprint 102, 1950, 12 pages.

Miscellaneous committee recommendations. (S11)

277-S. Some Considerations in the Provision and Operation of an Overseas Mail Service. James Gray. *Institution of Mechanical Engineers, Proceedings,* v. 162, No. 1, 1950, p. 1-12.

Engineering considerations of ship operation, with emphasis on service failures of engine and other parts. Major difficulty was encountered in connection with piston-rod fatigue failures. Trouble was alleviated by substitution of a crosshead of improved design. (S21, Q7, T22, ST)

278-S. Preparation of Stanniferous Materials for Analysis. A. G. Arend. *Industrial Chemist and Chemical Manufacturer,* v. 26, June 1950, p. 270-271, 274.

Wide variety of tin-bearing residues which are subjected to refining for their metal content. Methods for overcoming the difficulties of sampling such residues, which are much greater than in the case of metaliferous ores. (S11, Sn)

279-S. A Note on Precision in Metallurgical Analysis. Ernest H. S. van Someren. *Metallurgia,* v. 42, June 1950, p. 52.

Results obtained by different workers using different methods for alloying elements in standard steels. (S11, ST)

280-S. Sampling of Pig Iron and Cast Iron for Chemical Analysis. W. Westwood. *British Cast Iron Research Association Journal of Research and Development,* v. 3, June 1950, p. 377-380.

Recommended procedures. (S11, CI)

281-S. Determination of Carbon in Low-Carbon Ferrous Alloys by Means of Turbidimetric Analysis. (In French.) P. Agassant and J. L. Andrieux. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1950, p. 253-254.

Results of investigation of a series of alloys with carbon contents between 0.015 and 0.10% indicate applicability of the method, said to be very simple and having an accuracy comparable to that of the gravimetric method. (S11, Fe)

282-S. Study of Methods for Qualitative and Quantitative Analysis of Copper-Beryllium Alloys. I. Chemical Analysis. II. Physical Methods of Analysis. III. Emission Spectrophotometry. (In French.) Maurice Séguin and Lucien Gramme. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1950, p. 375-400.

Review of existing methods, plus experimental evaluation of some of them, with emphasis on methods which are selective, simple, rapid, and accurate. Part III describes a new spectrophotometric apparatus, claimed to be as accurate, yet much simpler than the complicated apparatus usually used. 134 ref. (S11, Cu)

283-S. New Optical Measuring Instruments for Inspection of Parts and Materials. (In German.) Albert Metz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, May 1, 1950, p. 323-331. (S14)

284-S. A Simple Quantitative Determination of the Degree of Reduction of Metal Powders and Semiconducting Powders. (In German.) Franz Skaupy. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 109-112.

Performed by dissolving the sample in a $FeCl_3$ solution and titrating the resulting bivalent iron with permanganate. (S12, H11)

285-S. Spectrographic Determination of Silicon in Cast Iron. (In Polish.) Z. Karlinski and J. Czakow. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, No. 2, 1949, p. 139-145.

Details of simple and rapid method. 11 ref. (S11, Si CI)

286-S. Quality Control: A New Field for Instrumentation. T. R. Hand and C. J. Falk. *General Electric Review,* v. 53, July 1950, p. 20-23.

Apparatus and procedures by which statistical quality control can be handled by instruments. The quality-control indicator consists of two basic units: a "totalizer", which counts total production and a "characteristic analyzer", which counts the number of units rejected for a given test. The computer compares these counts according to the mathematical formula, and the result is indicated on the "quality" meter of the characteristic analyzer. (S12)

287-S. Simple, Rapid Method of Producing Thermocouple Junctions. Karl F. Hager, Morris Rosenthal, and Werner Ross. *Oil and Gas Journal,* v. 49, July 13, 1950, p. 87-89.

In the process described, welding is accomplished by heat from an arc formed at the moment of contact between the thermocouple junction to be welded and an oil-covered mercury surface. The mercury and the thermocouple wires are connected to opposite poles of a source of current. (S16)

288-S. The Response of Thermocouples to Rapid Gas-Temperature Changes. M. W. Carbon, H. J. Kutsch, and G. A. Hawkins. *Transactions of the American Society, of Mechanical Engineers,* v. 72, July 1950, p. 655-657.

Experimental and theoretical data for response time of thermocouples ranging in wire size from 0.01 to 0.0005 in. The experiments were performed at temperatures from 70 to 950° F., and at air velocities of 0-125 fps. An equation is presented for computing response time for thermocouples fabricated from fine wires and subjected to sudden air-temperature changes. (S16)

289-S. Thermal Cracks in Turbine and Generator Rotor Forgings. A. W. Rankin, C. J. Boyle, C. D. Moriarty, and B. R. Seguin. *Mechanical Engineering,* v. 72, July 1950, p. 559-566.

Results of ultrasonic testing of large rotor forgings, with special emphasis on the need for careful interpretation, since nonmetallic inclusions cause reflections similar to cracks. A tabulation shows some general identifying characteristics of thermal cracks and nonmetallic inclusions. Spin tests resulting from thermal cracks of the size and distribution found in the investigation. (S13, T25)

290-S. Ultrasonics and Their Use for Non-Destructive Testing of Materials. N. G. Neuweiler. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 37-44.

Fundamental principles and applications. (To be continued.) (S13)

291-S. Optical Determination of the True Temperature of Luminescent Flames. (In German.) Fritz Rössler. *Zeitschrift für angewandte Physik,* v. 2, Apr. 20, 1950, p. 161-166.

Proposed method overcomes the difficulty of measuring the temperature of "nonblack" radiant bodies by optical pyrometry. The principle of the method, illustrated with Hefner's candle as an example, is based on the fact that soot particles, which make flames continuously luminescent, have the same temperature as the gases of the flame. 16 ref. (S16)

292-S. (Book) Industrial Inspection Methods. Rev. ed. Leon C. Michelon. 566 pages. 1950. Harper & Bros., New York 16, N. Y. $6.00.

Replaces 1942 edition. A basic but comprehensive presentation of principles and practices of industrial inspection work as it exists today. Major divisions of the work are concerned with basic concepts, dimensional control, testing for physical and mechanical properties, surface inspection, and inspection organization and personnel. (S general)

293-S. (Book) A.S.T.M. Specifications for Steel Piping Materials, Ed. 7. 328 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $3.00 (to A.S.T.M. members $2.25).

Latest compilation includes some 50 widely used specifications. Materials covered include: pipe used to convey liquids, vapors and gases at normal and elevated temperatures, still tubes for refinery service, heat exchanger and condenser tubes, and boiler and superheater tubes as well as castings, forgings, bolts, and nuts. (S22, ST)

294-S. (Book) A.S.T.M. Specifications for Steel Flat Products. 198 pages. (p. 311-508). Mar. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $2.25 (to A.S.T.M. members $1.75.).

The various A.S.T.M. specifications pertaining to steel plate, sheet and strip materials, including those for steel flat products for structural purposes and for boilers and pressure vessels, prepared by Committee A-1 on Steel; also other specifications developed by Committees A-10, A-2 and A-5 on stainless flat products, wrought iron, and metallic coated sheets. (S22, ST)

295-S. (Book) Ausgewählte Chemische Untersuchungsmethoden für die Stahl-und Eisenindustrie. (Selected Chemical Research Methods for the Steel and Iron Industry.) Otto Niezoldi. 184 pages. 1949. Springer-Verlag, Berlin, Gottingen, and Heidelberg, Germany.

Analytical procedures, divided into four parts. Part I: Steel, iron, and ferrous alloys. Part II: Nonferrous metals and alloys. Part III: Auxiliary materials, such as fuels, slags, refractories, etc. Part IV: Solutions for chemical analysis. (S11, ST)

T

APPLICATIONS OF METALS IN EQUIPMENT

297-T. Review of Metallurgy. *Mining Journal* (Annual Review Number), May 1950, p. 85.

Work of past year on new uses of various metals in the mining industry. (T28)

298-T. Magnesium in Navy Planes. J. E. Sullivan. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 433-438. Reprinted from *Aero Digest,* Jan. 1950; and condensed from *Magazine of Magnesium,* Aug. 1949.

(T24, Mg)

299-T. Metallurgical Problems in Oil Well Drilling and Petroleum Production. George W. Whitney and Morton Spar. *Metal Progress,* v. 57, June 1950, p. 755-760.

General discussion as applied to derrick equipment, power transmission, sucker rods, and pumps. Largely limited to ferrous alloys and their resistances to mechanical and corrosive effects.

(T28, Q general, R general, Fe)

300-T. Stainless Steel for Television. Arnold S. Rose. *Metal Progress,* v. 57, June 1950, p. 761-764.

Television picture tubes are made of ferritic stainless steel, to which is sealed the glass face plate. Expansion characteristics of the steel are important in making the glass-to-metal seal. Recent changes in alloy composition have enabled a 17% Cr iron to be substituted for the more costly 28% Cr alloy used previously. Significance of the austenite transformation in connection with expansion characteristics. (T1, K11, P11, SS)

301-T. Selecting Steels and Heat Treatments for Automotive Gears. V. E. Hense, H. H. Miller, and R. B. Schenck. *Materials & Methods,* v. 31, June 1950, p. 57-60.

Factors involved, and recommendations. (T7, T21, J general, ST)

302-T. Gray Iron Preferred for Large, Heavy Duty Crankshafts. Alexander Finlayson. *Materials & Methods,* v. 31, June 1950, p. 69-71.

Low notch sensitivity, high damping, and improved strength properties of properly processed and inoculated gray iron suit it to critical diesel-engine components. (T25, Q23, CI)

303-T. Materials at Work. *Materials & Methods,* v. 31, June 1950, p. 72-74.

Includes: Brazed cam formed from stamped copper-steel laminations; Mg-alloy chain saw; inert-gas-shielded arc welding for production of stainless steel tubing from coiled strip; steel wire brushes for removal of secondary mill scale; Al ceiling grid; and phenolic switch base. (T general, Mg, Al, ST, SS)

304-T. Modern Foundry Methods. *American Foundryman,* v. 17, June 1950, p. 36-37.

Redesign of a trailer hitch to take advantage of cost reduction and improved appearance inherent in castings. (T21, E general, CI)

305-T. Diesel Bearings. *Western Machinery and Steel World,* v. 41, June 1950, p. 78-80.

Casting and machining of large bearings of steel faced with Cu-Pb alloy and other bearing metals. (T7, E general, G17, SG-c)

306-T. Some Factors in Bi-Metal Lithography. Marvin C. Rogers. *Modern Lithography,* v. 18, June 1950, p. 45-48.

Problems involved in lithography using various dissimilar metal combinations for the printing and water-carrying surfaces. Wettabilities of the different metals, in relation to performance in use. (T9, P10)

307-T. Aluminum Die Castings Cut Costs, Reduce Weight, Improve Performance of Simplex Servi-Cycle. *Modern Metals,* v. 6, June 1950, p. 17-18.

Application to lightweight motorcycles. (T10, Al)

308-T. The Booming Furniture Market Pioneer Companies Open New Field for Aluminum. *Modern Metals,* v. 6, June 1950, p. 20-21.

Applications of Al to the above. (T10, Al)

309-T. Cold to the Last Drop. *Modern Metals,* v. 6, June 1950, p. 22.

"Frigice" is a new cup-like device of aluminum which includes ice compartment to keep drinks ice-cold without diluting them. (T10, Al)

310-T. Alcoa's Davenport Plant; World's Largest Aluminum Sheet and Plate Rolling Mill. *Modern Metals,* v. 6, June 1950, p. 30-31.

Plant includes many unusual and spectacular uses of Al in building construction. (T26, F23, Al)

311-T. Lead as a Construction Material in Chemical Processes. F. S. McCarthy. *Canadian Chemistry and Process Industries,* v. 34, June 1950, p. 474-477.

Relative merits of lead in sulfuric acid manufacture and processing. Dependence of chemical industry on lead despite its well-known structural defects. (T29, Pb)

312-T. Sales Opportunities in Perforated Metals. *Sheet Metal Worker,* v. 41, June 1950, p. 41-44.

Wide variety of applications in production and consumer goods. (T general, G3)

313-T. Modern Electrode Production. *Welding,* v. 18, June 1950, p. 248-254.

Equipment and procedures of British firm. Includes blending of powders for coatings, application of the coatings, drying, and testing. (T5)

314-T. Forgings. *British Steelmaker,* v. 16, June 1950, p. 316-320, 323. (Extracted from "British Standards for Steel and Steel Products—B.S. Handbook No. 10", 1949 Edition.)

Some of the more important uses of steel forgings in the engineering industry. (T general, F22, ST)

315-T. Air Force Planning to Build All-Magnesium Airplane. *CADO Technical Data Digest,* v. 15, July 1, 1950, p. 7.

Briefly describes and illustrates plane to be made entirely of Mg-Zr alloy. (T24, Mg)

316-T. Dynaflow Brake Band Simplified and Improved. Joseph Geschelin. *Automotive Industries,* v. 103, July 1, 1950, p. 42-44, 74.

Improved procedures and equipment for production from cold rolled SAE 950 N-A-X steel strip. Roll forming, projection welding, press forming, brazing, sawing, embossing, machining, shot peening, and broaching. (T21, G general, K3, K8, AY)

317-T. Aluminum Pipe Lines. W. B. Moore. *Welding Engineer,* v. 35, July 1950, p. 26-29.

Installation for gas and oil service, including arc welding and protective-coating application. Advantages, including cost savings. (T28, K1, L general, Al)

318-T. Experience in the Use of Copper Tubing for Mains and Services. S. A. Bradfield. *American Gas Association, Proceedings,* v. 31, 1949, p. 613-622.

Installation of copper gas mains and general service procedure. (T4, Cu)

319-T. Diaphragm Valve of New Design. *Light Metals,* v. 13, June 1950, p. 334-335.

Valve recommended for use in pipelines carrying liquids such as fruit juices, milk, etc., where glass-lined or bronze valves are commonly used. Includes long list of fluids for which Al valve bodies are suitable, also a shorter list for which Al is not recommended. (T29, R5, Al)

320-T. Light Alloy Aids Light Control. *Light Metals,* v. 13, June 1950, p. 342-343.

Aluminum venetian blinds and new type of light diffuser made of continuous strips of thin Al and suspended in panels over the whole ceiling and under the lighting units. (T10, Al)

321-T. Furnace Design and Practice. R. J. Sarjant. *Institution of Mechanical Engineers, Proceedings,* v. 162, No. 1, 1950, p. 75-85; discussion, p. 86-92.

See abstract from *Engineer,* item 40-T, 1950. (T5)

322-T. Use of Metallic Crucibles for Melting Aluminum Alloys. (In French.) Jean Duport. *Fonderie,* Apr. 1950, p. 2017-2023.

In certain cases the use of metallic crucibles is quite advantageous. Various factors involved including advantages and disadvantages, choice of type of alloy for the crucibles (various ferrous alloys are described), Al alloys which can be melted in metal crucibles, crucible design and dimensions (diagrams), effect of method of heating and necessary precautions. (T5, E10, Fe, Al)

323-T. Petroleum: Raw Material of Modern Chemistry. (In French). Maurice Victor. *Revue de l'Aluminium,* v. 27, Apr. 1950, p. 145-151.

British petroleum refinery with emphasis on extensive use of Al and its alloys. (T29, Al)

324-T. Soft Steel and Cast Iron for Rolling-Mill Bearings. (In Czech.) Josef Teindl. *Hutnické Listy,* v. 5, Mar. 1950, p. 97-101.

Possibility of using various types instead of bronze. Bearing details and plant experiments. 12 ref. (T5, CN, CI)

325-T. Brake Drum Materials. Fred J. Walls. *Foundry,* v. 78, July 1950, p. 68-69, 182-184, 186.

Some of the requirements of a suitable brake drum material and metallurgical factors involved in its selection. Property data on "pure" commercial metals and cast alloys are charted, tabulated, and discussed. (To be continued.) (T21, T24, P general, Q9)

326-T. Heavy Duty Bearing Retainers. *Die Casting,* v. 8, July 1950, p. 23-24.

Bearing housings of die-cast Zn are used to support shafts for conveyor-belt idler pulleys in trench-digging machine. (T4, Zn)

327-T. Work Accomplished. *Die Casting,* v. 8, July 1950, p. 26, 58-59.

How flexibility of design permitted by usage of Al and Zn die castings allowed Service Recorder Co. to incorporate new features in its movement-recording devices. (T8, Al, Zn)

328-T. Put It in Writing. *Die Casting,* v. 8, July 1950, p. 28-30.

Use of Al alloy die castings in

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32ND

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instruments manufactured by Tel-Autograph Corp., for immediate transmission of handwritten messages from one location to another. (T8, Al)

329-T. For the Best Service Garage Instruments Make Use of Aluminum, Zinc, and Lead Die Castings. *Die Casting*, v. 8, July 1950, p. 32-34, 36.

Automotive testing apparatus manufactured by Heyer Industries. (T8, Al, Zn, Pb)

330-T. Alloy Steel Churn Drill Bits Prove Superior in Tough Ground. J. H. Dewey and T. N. Armstrong. *Engineering and Mining Journal*, v. 151, July 1950, p. 64-66.

Compares performance of carbon steel and SAE 4340 in drilling various types of rock. (T29, CN, AY)

331-T. There's Sunshine in the Subway Now! *Steel Horizons*, v. 12, Summer 1950, p. 8-9.

Stainless-steel subway cars for New York City. (T23, SS)

332-T. Applications of Light-Metal Castings. (In German.) A. Buckeley. *Neue Giesserei*, v. 37 (new ser., v. 3), May 18, 1950, p. 190-194.

Numerous ways of using cast light metals (Al alloys) for machine and equipment parts. 11 ref. (T general, E general, Al)

Toledo Chapter Formed

Toledo, Ohio, members of the American Society for Metals have formed an independent chapter of the society. Formerly functioning as the "Toledo Group" of the Detroit Chapter, they have for some time held separate meetings and elected separate officers. The new chapter numbers 107 members on its roster.

V

MATERIALS
General Coverage of Specific Materials

139-V. Titanium Alloys. *Engineer*, v. 189, May 26, 1950, p. 630-631.

Preparation of binary, ternary, and quaternary alloys; their fabrication and properties. (Ei)

140-V. Zirconium and Its Compounds. A. E. Williams. *Mining Journal* (Annual Review Number), May 1950, p. 44-45, 47-49.

Production, properties, fabrication, and uses. (Zr)

141-V. New Aluminum Alloy Offers High As-Cast Properties. *Materials & Methods*, v. 31, June 1950, p. 61-62.

Physical and mechanical properties of "Almag 35". Use of high-purity Al results in a corrosion resistant casting alloy with exceptional strength, ductility and machinability without need for heat treatment. (Al)

142-V. Vanadium. J. Lomas. *Mine & Quarry Engineering*, v. 16, June 1950, p. 225-228.

Surveys ore reserves, recovery, properties, and applications, especially in ferro-alloys and alloy steels. (B10, V, AY, Fe-n)

143-V. Magnesium-Cerium Wrought Alloys for Elevated-Temperature Service. K. Grube, J. A. Davis, and L. W. Eastwood. *American Society for Testing Materials*, Preprint 30, 1950, 23 pages.

Experimental procedure includes melting and casting of alloys, scalping the billet to approximately 3 in. diam., extruding to ¾ in. diam., heat treating, and performing tension and short-time creep tests. (Mg, SG-h)

144-V. Some Properties of Tantalum-Rich Alloys With Wolfram and Molybdenum. Rupert H. Myers. *Metallurgia*, v. 42, June 1950, p. 3-9.

Effects of tungsten and molybdenum on workability, ultimate tensile strength, hardness, electrical resistivity, work hardening rate, elongation rate, oxidation resistance, and temperature required for annealing. (Ta)

145-V. Steels for Screw Threads. (In French.) F. Hauth. *Revue de Métallurgie*, v. 47, Apr. 1950, p. 271-285; discussion, p. 285-286.

A résumé of the conclusions of the study by the Commission of Metallurgical Engineers in France. Particular emphasis is placed on specific compositions of such steels and the influence of alloying elements on machinability and mechanical properties. Heat treatment methods and schedules, ingot-casting practice, rolling practice, and their influence. (Q general, G17, ST, SG-k)

146-V. A New Light Alloy of Medium Strength: Superalumag T.35. (In French.) Jean Herenguel. *Revue de l'Aluminium*, v. 27, Apr. 1950, p. 133-140.

From the series of ternary Al-Zn-Mg alloys the Company, Trefileries et Laminoirs du Havre, has selected a product containing 2.75-3.25% Zn and 1.50-1.75% Mg which is low compared with Zicral or Superalumag T.60. Known as T.35, this product is easily deformed, forged, or extruded. Self-tempering, it gives good results in weld seams; it can be anodized and has the corrosion resistance of the A-G series. 14 ref. (Al)

147-V. Nodular Iron's Record—Two Years Later. *Steel*, v. 127, July 17, 1950, p. 85-89, 100.

Performance data gradually being accumulated presage a strong role for nodular-graphite cast iron as an engineering material. Results of experimental work and some facts as to how the new material stands up under service conditions are summarized. Experiences of ten U. S. companies. (CI)

148-V. Commercial Uses of Magnesium in Germany. Part I. E. J. de-Ridder. *Modern Metals*, v. 6, June 1950, p. 25-28.

Three-part report deals with the research and development work on Mg alloys carried out at the I. G. Farben plant at Bitterfeld, Germany. (To be continued.) (Mg)

149-V. Where Is Cast Iron Going To? P. A. Russell. *Foundry Trade Journal*, v. 88, June 29, 1950, p. 697-702.

Development of nodular iron and its present and potential applications. Mechanical properties and microstructures. (CI)

Casting Design Contest

Gray Iron Founders' Society has announced an industry-wide contest to determine outstanding examples of redesign of parts or components for production as a casting instead of some other type of construction.

The society's Advertising Committee will be the judges, with cash prizes for the best and next-best examples submitted. Further information may be obtained from Gray Iron Founders' Society, Inc., 210 National City-E. 6th Bldg., Cleveland 14, Ohio.

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EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

RESEARCH METALLURGIST: Civil service position. B.S. with high-grade experience or preferably doctor's degree with minimum working experience of four years in professional scientific employment. Position in melting and casting of metals, both ferrous and nonferrous. Experience in following will be of importance: vacuum melting and casting, melting and casting of titanium, gases dissolved in molten metals and effect of vibration on the solidification of metals. Box 8-5.

Midwest

GRADUATE ASSISTANTSHIP: Available in physical metallurgy in department of metallurgical engineering of school of mines and metallurgy. Recipient can take ⅔ of a full schedule toward M.S. or Ph.D. degree. Box 8-10.

FERROUS METALLURGIST: Desired age, 30 to 55. B.S. degree. Five to ten years industrial experience. For laboratory development and plant liaison on new products and improvements. Must be thoroughly familiar with heat treatment of low-alloy steels. Experience with rolling and forging processes, technical report writing desirable. State expected salary. Box 8-15.

RESEARCH METALLURGISTS: Excellent openings for metallurgical engineers with research experience. Prefer men with advanced college training but not essential. Should be able to initiate and execute over-all research program. Metals Department, Armour Research Foundation, Chicago 16, Ill.

RESISTANCE WELDING ENGINEER: Excellent opening for engineer with resistance welding background, interested in research or development in this field. Prefer man with advanced college training but not essential. Should be able to initiate and execute over-all research program. Metals Department, Armour Research Foundation, Chicago 16, Ill.

METALLURGIST: Experienced in heat treating fundamentals and interested in sales and development work. Box 8-20.

METALLURGICAL SALES DEVELOPMENT: Attractive and responsible position available in Chicago for a graduate metallurgical engineer who is 32 to 38 years old and who has had experience in the processing and application of alloy steel. Box 8-25.

METALLURGIST: For materials engineering position involving the selection, fabrication and joining of nonferrous metals used in electrical apparatus. Location Pittsburgh. For applications write: Manager, Technical Employment, Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Pa.

FOUNDRY RESEARCH SUPERVISOR: Opportunity for experienced foundry metallurgist to organize and direct an important foundry research program. Should have interest and knowledge of modern research methods in addition to a practical foundry background. Salary commensurate with qualifications. Box 8-170.

Canada

SALES REPRESENTATIVE: Energetic, with metallurgical engineering training, 30 to 35, with thorough knowledge of high-grade steels, such as toolsteels, and their applications, required by important Swedish steel manufacturer. Applicant must be able to assume complete charge of branch office to be opened in Toronto district and must have good connections. Reply with full details in first letter regarding age, qualifications, salary requirements. Box 8-30.

South

TEACHING: Rank of instructor to associate professor depending on experience. Teach metallography, physical metallurgy and experienced in X-rays and crystal structure of metals. Box 8-35.

West

METALLURGIST: Pacific Northwest aluminum manufacturer has opening for experienced man. Metallurgical experience in light alloys desirable. In reply please submit details of education, experience and salary requirements. Box 8-40.

POSITIONS WANTED

COLD STRIP MILL SUPERINTENDENT: Has 20 years experience in all phases of the cold strip business, such as pickling, rolling, annealing, slitting and cutting. This also includes the direction of the personnel involved. Desires position in supervisory or advisory capacity. Box 8-45.

METALLURGIST: For plant research or production. M.S. from Colorado School of Mines this year. Background in extractive metallurgy and physical metallurgy. Navy experience in electrical and electronic circuits and devices. Married, age 27. Box 8-50.

METALLURGICAL ENGINEER: B.S. from Lehigh University. Veteran with family, age 30. Author of published papers. Four years experience in research and development work in wire industry as department head. Some production experience. Progressive, capable, ambitious. Desires position of responsibility with promising future. Box 8-55.

METALLURGIST: M. Met. E. in June 1950. Several years experience including aluminum and powder metallurgy research, foundry and heat treatment. Age 33. Desires position in East or Midwest. Box 8-60.

PRODUCTION ENGINEER: Experience in making of soft steel and alloy steel, extraction and refining of nonferrous metals, powder metallurgy and instruments and means of metallurgical research. Desires position as production engineer or metallurgist. Age 36, married. Available now. Box 8-65.

METALLURGIST: B. S. in chemical engineering. Experience: four years plant metallurgist in ferrous and nonferrous precision plant, of which two years was as plant manager; six years quality control work, production problems and trouble shooting in the following fields—aviation, ordnance and presses; for three years in supervisory capacity. Box 8-70.

METALLURGIST: Five years in research and development laboratories, including high-temperature brazing and subzero properties of materials. B.S. in metallurgical engineering. Studying for M.S. at Stevens Institute of Technology. Desires position in research or development laboratory in New York metropolitan area. Age 31, married. Resume on request. Box 8-75.

METALLURGICAL ENGINEER: B.S. from Columbia University, 1950. Age 22, single, no geographic preferences. Desires position involving work in heat treating, foundry or metal forming fields. Will also consider welding, electrochemical, and corrosion resistance opportunity. Box 8-80.

METALLURGIST: Twelve years of diversified industrial experience in the heat treatment of tools, dies, production items, and nonferrous metals. Experienced in ordnance and aircraft work. Five years of college work with B.S. in metallurgical engineering. Married, age 36. Excellent references. Progressive, efficient. Location immaterial. Box 8-85.

METALLURGICAL ENGINEER: Recent graduate, single, veteran, age 27. Two years industrial training before entering school. Desires position in production or sales. Location immaterial. Box 8-90.

METALLURGIST: Engineering graduate. Nine years laboratory and production experience in selection, heat treatment, control of engineering materials, and processes for manufacturer of automotive equipment. Contacts in central New York. Seeking connection with steel or equipment sales organization in sales or technical service capacity. References. Age 32. Box 8-95.

DROP FORGING SUPERINTENDENT: Excellent metallurgical background; well experienced in die designing, estimating, supervision of personnel and operation of steam and board drop hammers, forging presses, upsetters, and auxiliary forging equipment. Capable of taking complete charge, desires position where honesty and able effort are considerations. Box 8-100.

METALLURGICAL ENGINEER: B. Met. E., Polytechnic Institute of Brooklyn, June 1950. Age 26, single, veteran. Desires to train for responsible position in development or production. Familiar with high-vacuum technique and gas-metal equilibria. Will relocate. Box 8-105.

METALLURGIST: Recent graduate from University of Kentucky. Interested in both ferrous and nonferrous physical or extractive metallurgy. Will accept position in any part of the United States or in a foreign country. Age 26, single, veteran. Box 8-110.

HIGH TEMPERATURE METALLURGIST: B.S. degree in metallurgy. Age 35, married, two children. Thirteen years of metallurgical experience: 8 years in all phases of the development and testing of high-temperature alloys for large stainless steel producer; 3 years experience in production metallurgy of carbon steel sheet and strip for a leading carbon steel producer; 2 years experience in chemical plant control work. Available immediately. Location unimportant. References furnished upon request. Box 8-115.

METALLURGICAL ENGINEER: B. Eng. Recent graduate from Canadian University. Veteran, single, 27 years of age. Interested in production control leading to supervisory work. Willing to work as a laborer preferably on blast, electric or openhearth furnaces. Advancement on merit basis. Presently employed. U. S. citizen. Two weeks notice necessary. Box 8-120.

SUPERVISOR: Former chief metallurgist and director of research, 25 years experience, desires supervisory position with large manufacturing company. Box 8-125.

METALLURGIST: Veteran. B.S., M.S. Age 29, married. Good knowledge of applications and production methods of plain carbon, alloy steels and cast irons. Desires work leading to sales or metallurgical contact work. Prefers western New York area but will consider other sections of country. Box 8-130

JUNIOR RESEARCH ENGINEER: Veteran, age 28. One year's experience on corrosion of pipe lines research. Degree in metallurgical engineering from Ohio State, 1949; also laboratory assistant there. Box 8-135.

METALLURGIST: Graduate; age 35. Extensive experience in all aspects of cartridge case and shell production. Desires supervisory position in technical or production end of related work. Excellent references. Location immaterial. Box 8-140.

TECHNICAL LIBRARIAN: A.M.L.S. University and research library experience. Desires position in midwest, preferably in Wisconsin-Minnesota area or vicinity. Box 8-145.

METALLURGICAL ENGINEER: B.S. in Met. Eng. Age 24, married. Two years experience in development, quality control and research metallurgy of secondary aluminum. Limited experience in other nonferrous metals. Currently employed. Desires responsible position in development, quality control, or research metallurgy. Will locate anywhere in U. S. Box 8-150.

METALLURGICAL ENGINEER: B.S., University of Pittsburgh. Age 35, married, veteran. Ten years experience in physical testing of wire products; two years in patenting process of steel wire and rods; one year in galvanizing of wire; and limited experience in hot rolling of ingots into bars, billets and rounds. Location unimportant. Box 8-155.

METALLURGIST: Met. Engr., Sc.D. Desires teaching position. Seven years of college teaching and 12 years of industrial metallurgical research experience. Sincerely interested in engineering education, having had repeated opportunities to observe its products. Box 8-160.

RESEARCH METALLURGIST: Sc.D. Fifteen years research and plant experience with tool, high speed, stainless and special steels in addition to some work with nonferrous alloys. Desires plant or research metallurgical position in East. Box 8-165.

Prepare now to enter the fifth

METALLOGRAPHIC EXHIBIT

to be held at the National Metal Congress and Exposition in Chicago, Oct. 23 to 27, 1950. Rules are simple and few; there are no restrictions as to size or method of mounting. A large area in the exhibition hall has been reserved so the entries can be displayed to best advantage.

RULES FOR ENTRANTS

Work which has appeared in previous Metallographic Exhibits held by the American Society for Metals is unacceptable.

Photographic prints shall be mounted on stiff cardboard, each on a separate mount. Each shall carry a label giving:

Name of metallographer
Classification of entry
Material, etchant, magnification
Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into an ordinary lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Oct. 1 and Oct. 20, 1950, either by prepaid express, registered parcel post, or first-class letter mail.

Address: Metallographic Exhibit
c/o W. H. Eisenman
National Metal Congress and Exposition
International Amphitheater, Chicago, Ill.

CLASSIFICATION OF MICROS

1. Cast Irons and Cast Steels
2. Toolsteels (except Carbides)
3. Irons and Alloy Steels (excluding Stainless) in Wrought Condition
4. Stainless and Heat Resisting Steels and Alloys
5. Light Metals and Alloys
6. Heavy Nonferrous Metals and Alloys
7. Powder Metals (and Carbides) and Compacts
8. Weld Structures (including brazed and similar joints)
9. Series of Micros Showing Transitions or Changes During Processing
10. Surface Phenomena and Macrographs of Metallurgical Objects or Operations (2 to 10 diam.)
11. Results by Non-Optical or other Unconventional Techniques.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a first prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded to other photographs which, in the opinion of the judges, closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate, and a money award of $100 will be awarded the exhibitor whose work is adjudged "best in the show", and his exhibit shall become the property of the American Society for Metals for preservation and display in the Sauveur Room at the Society's Headquarters.

All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Oct. 29, 1950.

Entrants living outside the U. S. A. will do well to send their micrographs by first-class letter mail endorsed "May be opened for customs inspection before delivery to addressee".

32nd NATIONAL METAL CONGRESS AND EXPOSITION

October 23-27, 1950

HOLDEN SALT BATHS, FURNACES AND SALT BATH CONVEYORS FOR BRIGHT HARDENING —TEMPERING—ANNEALING—DESCALING . . .

Aluminum Heat Treating

Austempering

Blacking—
(1) Stainless Steel (3) Malleable Iron
(2) Cast Iron (4) Mild Steel

Brazing

Bright Tempering

Controlled Quenching

Descaling

Forging

Flow Heat Treatment

High Speed Hardening

Martempering

Neutral Hardening

Non-ferrous Annealing or Heat Treatment

Secondary Heat Treatment

Spheroidizing

Silver Soldering

Stainless Steel Hardening

Tempering

Wire Annealing

Wire Patenting

Liquid Carburizing

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